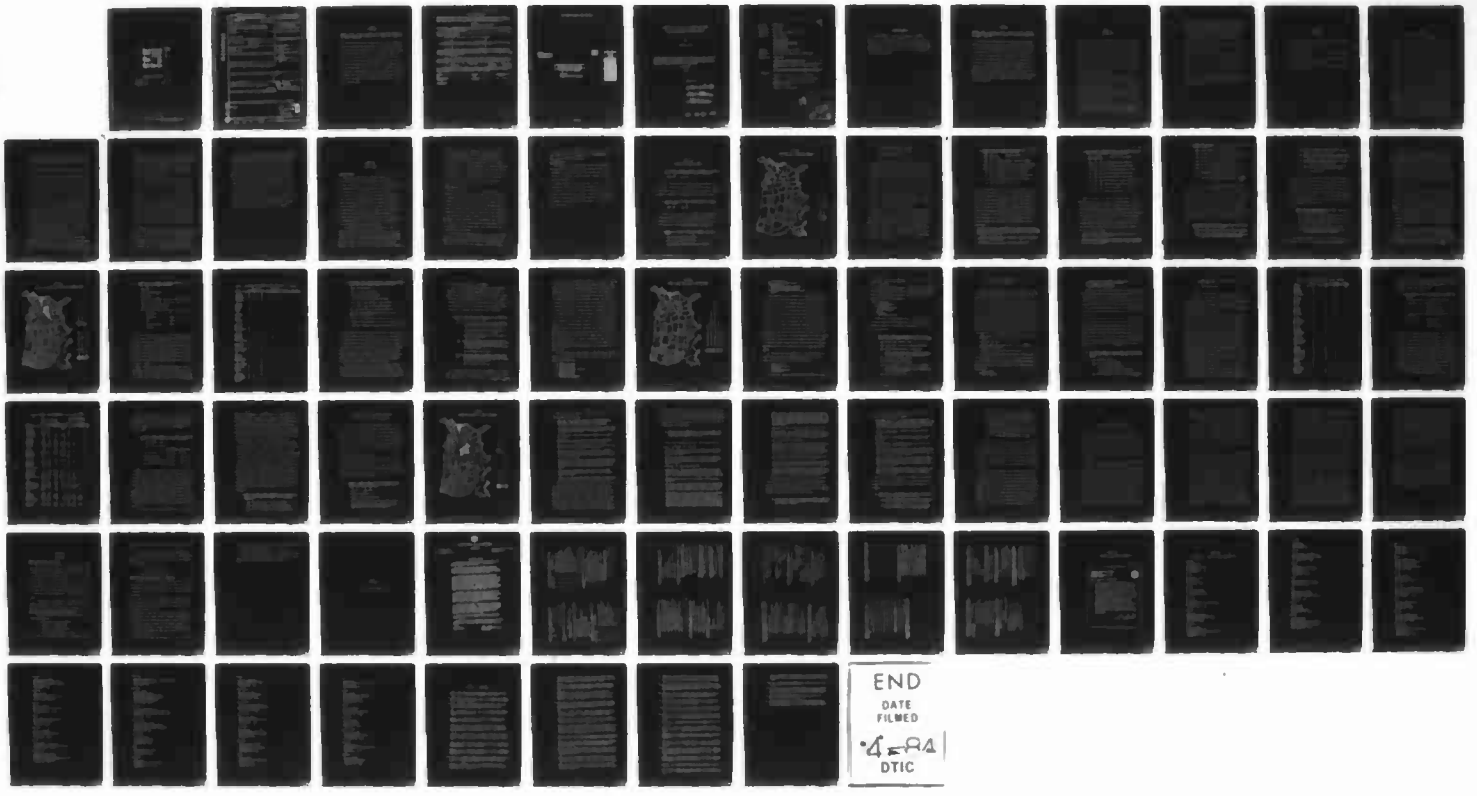
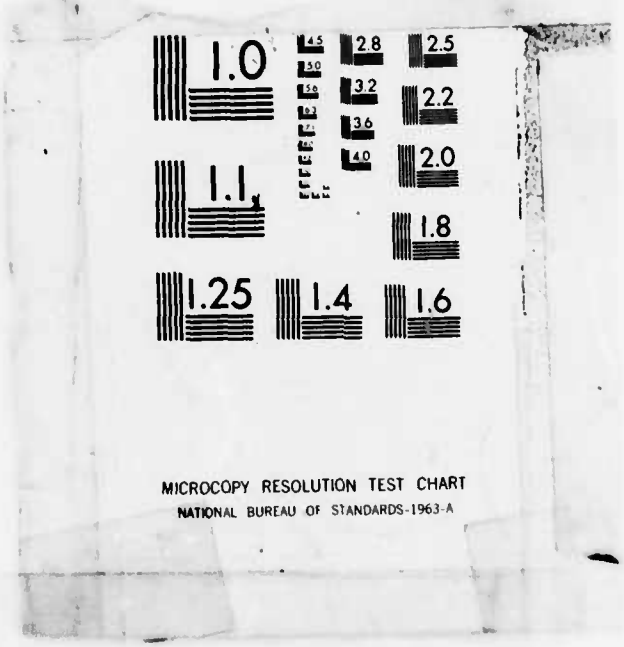
AD-A139 167 A SURVEY OF THE USE OF FLEXIBLE EFFLUENT STANDARDS BY STATE WATER QUALITY MANAGEMENT AGENCIES(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH D B HULL 1983 1/1

UNCLASSIFIED AFIT/CI/NR-83-85T F/G 13/2 NL



END
DATE FILMED
4-84
DTIC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

UNCLASS

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

AD A139167

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: AFIT/CI/NR 83-85T	2. GOVT ACCESSION NO.: AD-A139167
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): A Survey of The Use of Flexible Effluent Standards by State Water Quality Management Agencies	5. TYPE OF REPORT & PERIOD COVERED: THESIS/DISSERTATION
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Daniel B. Hull	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: AFIT STUDENT AT: University of North Carolina Chapel Hill	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: AFIT/NR WPAFB OH 45433	12. REPORT DATE: 1983
	13. NUMBER OF PAGES: 48
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office):	15. SECURITY CLASS. (of this report): UNCLASS
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Approved for public release: IAW AFR 190-17.

LYNN E. WOLAVER
Dean for Research and Professional Development
Air Force Institute of Technology (AU)
Wright-Patterson AFB OH 45433

18. SUPPLEMENTARY NOTES

APPROVED FOR PUBLIC RELEASE: IAW AFR 190-17

13 Feb 1984

LYNN E. WOLAVER
Dean for Research and Professional Development

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

ATTACHED

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASS

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ABSTRACT

DANIEL B. HULL. A Survey of the Use of Flexible Effluent Standards by State Water Quality Management Agencies. (Under the direction of DR. JAMES C. LAMB, III)

A questionaire was sent to each state water quality management agency to investigate the present use of flexible effluent standards in the United States. Responses from 48 states reveal that 45 states use flexible effluent standards and over half plan to expand their use of them in the future. There is great variability from one state to the next in the type and amount of flexibility used with only a few states routinely using flexible standards. An exploration of the techniques used successfully by some states to manage flexible standards is used to make recommendations on ways to expand use of flexible standards. Since over half the states infrequently use flexible standards there is a potential for substantial monetary savings through their increased use.

AFIT/CI/NR 83-85T

AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to ascertain the value and/or contribution of research accomplished by students or faculty of the Air Force Institute of Technology (ATC). It would be greatly appreciated if you would complete the following questionnaire and return it to:

AFIT/NR
Wright-Patterson AFB OH 45433

RESEARCH TITLE: A Survey of The Use of Flexible Effluent Standards by State Water Quality Management Agencies

AUTHOR: Daniel B. Hull

RESEARCH ASSESSMENT QUESTIONS:

1. Did this research contribute to a current Air Force project?

( ) a. YES ( ) b. NO

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not?

( ) a. YES ( ) b. NO

3. The benefits of AFIT research can often be expressed by the equivalent value that your agency achieved/received by virtue of AFIT performing the research. Can you estimate what this research would have cost if it had been accomplished under contract or if it had been done in-house in terms of manpower and/or dollars?

( ) a. MAN-YEARS _____ ( ) b. $_____

4. Often it is not possible to attach equivalent dollar values to research, although the results of the research may, in fact, be important. Whether or not you were able to establish an equivalent value for this research (3. above), what is your estimate of its significance?

( ) a. HIGHLY SIGNIFICANT ( ) b. SIGNIFICANT ( ) c. SLIGHTLY SIGNIFICANT ( ) d. OF NO SIGNIFICANCE

5. AFIT welcomes any further comments you may have on the above questions, or any additional details concerning the current application, future potential, or other value of this research. Please use the bottom part of this questionnaire for your statement(s).

NAME GRADE POSITION

ORGANIZATION LOCATION

STATEMENT(s):

FOLD DOWN ON OUTSIDE - SEAL WITH TAPE

AFIT/NR
WRIGHT-PATTERSON AFB OH 45433

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 73236 WASHINGTON D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

AFIT/ DAA
Wright-Patterson AFB OH 45433

FOLD IN

A SURVEY OF THE USE OF FLEXIBLE EFFLUENT STANDARDS BY STATE WATER QUALITY MANAGEMENT AGENCIES

by

Daniel B. Hull

A report submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Public Health in the Department of Environmental Sciences and Engineering, School of Public Health

Chapel Hill

1983

Approved by:

Dr. James C. Lamb III, Advisor

Dr. Morris A. Shiffman, Reader

Dr. Alvis G. Turner, Reader

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

Special thanks to Dr. James C. Lamb, III for his guidance, support and continual positive reinforcement throughout this project. Thanks go to Dr. Shiffman and Dr. Turner for their encouragement and personal interest. I would also like to thank my family who supported me daily through the endeavor and the U.S. Air Force for making this whole experience possible.

ABSTRACT

DANIEL B. HULL. A Survey of the Use of Flexible Effluent Standards by State Water Quality Management Agencies. (Under the direction of DR. JAMES C. LAMB, III)

A questionaire was sent to each state water quality management agency to investigate the present use of flexible effluent standards in the United States. Responses from 48 states reveal that 45 states use flexible effluent standards and over half plan to expand their use of them in the future. There is great variability from one state to the next in the type and amount of flexibility used with only a few states routinely using flexible standards. An exploration of the techniques used successfully by some states to manage flexible standards is used to make recommendations on ways to expand use of flexible standards. Since over half the states infrequently use flexible standards there is a potential for substantial monetary savings through their increased use.

CHAPTER I

INTRODUCTION

Until recently, states set effluent standards for each wastewater constituent at a single level that had to be met year around. The levels in the standards were designed to maintain acceptable stream water quality at summer temperatures during minimum stream flow. While this was almost certain to protect water quality, the standards were more stringent than if they were based on the lower temperatures and higher stream flows that are actually present most of the time. These stringent standards required larger and more complex treatment facilities, which cost more to construct and operate than is necessary to meet the stream water quality goals.

As waste treatment plant construction and operating costs continued to increase, state agencies explored methods to reduce these expenses and still protect water quality. Some methods they have used are various forms of flexible effluent standards - standards that may vary during the year in response to certain environmental variables. These types of standards allow some dischargers to reduce treatment costs by utilizing some of a stream's assimilative capacity to perform part of the waste treatment.

The General Accounting Office (GAO) reviewed potential methods of reducing construction and operating costs while maintaining water quality (12). They concluded that flexible effluent standards are not

being used frequently enough in light of the millions of dollars that could be saved by using them. They recommended that the Environmental Protection Agency (EPA) use flexible effluent standards whenever they can and strongly encourage the delegated states to use them also.

Wastewater engineers and other allied professionals from universities, industries and municipalities have encouraged the use of flexible effluent standards (4,6,22,24,26,34,35,41). They feel it is technologically feasible to maintain water quality when using flexible standards to reduce expenditures.

A survey of state water pollution control agencies was conducted in 1979 to determine how many states were using seasonal effluent standards (14). At that time 21 states were using them and five more were planning to do so, out of 39 states responding. States that were using seasonal standards indicated that they planned to continue that practice.

The goal of this survey was to update information on the use of flexible effluent standards. It also expands on some findings of the previous survey and explores new topics to clarify the present uses of flexible standards.

CHAPTER II

OBJECTIVES

The overall objective of this report is to investigate the present use of flexible effluent standards in the United States.

Specific objectives are:

1. To determine the extent that flexible effluent standards are utilized by the states.

2. To determine some of the perceived advantages and disadvantages of flexible effluent standards in field application.

3. To determine specific techniques used by states for setting flexible effluent standards.

CHAPTER III

FLEXIBILITY OF EFFLUENT STANDARDS

The use of flexible effluent standards is based on the premise that streams and rivers have the biological capability of purifying themselves of certain types of waste products (6,10,24,27,30,34,36,39). This assimilative capacity depends on many things including the amount of potential pollutant (natural or manmade) loading already present in the stream, volume of streamflow and stream temperature (6,22,24,30,36,39,40). A reduction in water temperature decreases the biological activity of microorganisms and increases the oxygen saturation level of the water (29,30,36,39). This results in an assimilative capacity during winter months which is capable of accepting a greater biological (BOD) and nitrogenous (NOD) oxygen demand without harm,than in the winter months. Stream flow variations tend to add to this seasonal effect since stream flows are usually greater in the winter than in the summer. This greater stream assimilative capacity in the winter can be utilized to supplement the treatment done in waste treatment facilities rather than requiring larger and more expensive treatment facilities (6,22,23,24,27,34).

Although the existence of a stream's assimilative capacity is well established (5,6,10,22,26,29,30,34,36,38,39), there is not unanimous agreement that it should be fully utilized. Some feel that any use of a stream for disposing of man-made waste is an abuse of the

natural system (8,9). This indeed was the thinking of some members of Congress when writing the "zero pollutant discharge goal" into the Federal Water Pollution Control Act Amendments (FWPCAA) of 1972 (19, 26).

The FWPCAA of 1972 dramatically changed the requirements for managing water quality (3,15,19,28). Prior to 1972, primary responsibility for water pollution control programs rested with the individual states which used only water quality standards to protect water quality (3,15,28,31). There was some concern, however, during the environmental movement of the early 1970's that the states were not attacking the water pollution problem as aggressively as they should (3,33). Congress through the FWPCAA of 1972 attempted to increase the effectiveness of water pollution control by requiring that a minimum level of waste treatment be established for each discharger based on what is technologically attainable rather than on the quality of the receiving water (3,15,19,31,32,37). If the effluent quality required by these technology-based standards was insufficient to meet stream water quality standards, additional control methods were required (16, 19,27,37,38,42). The Act also gave the Federal government, through EPA, the primary responsibility in defining, directing and enforcing water quality management programs nationwide (15,19,26,33). Thirty-five states have been delegated authority to run the programs but the ultimate authority resides at the federal level (15,19).

Dischargers who must use treatment technologies beyond those required by technology-based standards frequently must meet standards set at a single level to protect the receiving stream during the worst case situation (23,25,26,34). This may represent a short critical

period (usually a period of low stream flow and high water temperature) that may occur as infrequently as every ten years. Many knowledgeable individuals feel that these single level effluent standards are overly expensive and do not provide perceptible benefits over using less waste treatment during most of the year (4,6,26,34,35,41). They have encouraged more flexibility to utilize the stream's assimilative capacity for treating waste discharges.

Flexible effluent standards allow dischargers to utilize the assimilative capacity of streams, rather than using additional expensive waste treatment in the winter when it is not needed to protect water quality (3,6,7,12,13,20,22,23,24,28,34,35,38,41). Flexible effluent standards are being utilized by some states to reduce the capital expenditures and operating costs for waste treatment plants (14). The state of Georgia analyzed the potential savings that could be realized at some publicly owned treatment works (POTWs) by using monthly variable effluent standards (34). The estimated capital savings for 11 facilities was $21 million, resulting in 9% lower expenditures than those under single level effluent limits. The operating cost savings for 19 facilities was estimated to be $3.3 million per year, resulting in 8.9% less cost than that under single level effluent limits.

A study of 23 waste treatment plants in North Carolina estimated a $2.9 million per year savings in operation and maintenance costs by allowing a lower level of waste treatment for five months of each year (17). In that study the BOD content of discharges was allowed to vary only up to double the level permitted in summer months.

Another potential benefit of using flexible effluent standards is

a reduction in National Pollutant Discharge Elimination System (NPDES) permit violations. The GAO reported that 87% of 242 POTWs studied violated their NPDES discharge permits for at least one month and 56% of these violated them over half the time (11). There was no mention of whether the water quality was degraded as a result of the violations. A study done in North Carolina of 29 major POTWs, reported to have NPDES permit violations, found that 27 did not cause violations of dissolved oxygen (DO) standards in the receiving streams (18). In the remaining two circumstances there was a possibility that the higher effluent BOD may have caused low DO levels downstream. NPDES violations do not necessarily cause a deterioration of stream water quality. The public, however, views each violation as a failure of the pollution control programs even though no water quality problem may be directly attributed to the violation (23,24). If flexible standards were used, violations which result without attending water quality problems should occur less frequently (23).

CHAPTER IV

SURVEY METHODS

The Questionaire

The survey was conducted by developing a questionaire and mailing it to the water quality management agency in each state and the District of Columbia. A cover letter was used to define flexible effluent standards and explain the purpose for the survey. A copy of the questionaire with the cover letter may be found in Appendix A.

The bulk of the questionaire directly addresses how and why the states use or don't use flexible effluent standards. Both technical aspects and agency philosophy are examined. Questions 20 through 23 deal with the related area of monitoring and how it is being accomplished. Question 24 was included at the request of North Carolina personnel to determine how other states handle the problem of discharging wastes into intermittent streams. Because this paper deals with flexible standards the other questions will be discussed only when the findings relate directly to that topic.

An attempt was made to write the questionaire so it could be easily understood by agencies with varying experience in the use of flexible standards. The questions were written so a person knowledgeable about a state's water quality program could answer them rapidly. Whenever possible, the questions were followed by some possible answers to clarify for the respondent the type of information desired.

Since these answers may not always fit the situation in each state, room was provided to write in additional answers or comments.

The questionaire turned out to be 11 pages long counting the cover letter -- much longer than originally planned or desired. Instead of reducing the number of questions, the pages were reduced in size and printed in two columns and on both sides of the pages. This gave the questionaire an illusion of being shorter in the hope that more agencies would be willing to respond. As a further incentive to get a high response rate, a summary of the survey responses was promised to each agency that filled out the questionaire.

Distribution and Follow-up

Questionaires were mailed to state water quality management agencies as many as four times in an attempt to get the maximum number of responses. They were first sent to the 51 agencies using the best available listing of personnel and addresses (1). Nineteen were completed and returned. About one month later the same questionaire was mailed to the remaining states with an additional note (see Appendix B) encouraging the recipient to reply; 16 additional states responded.

In another month a second follow-up, using just the questionaire, was mailed to agency addresses that had subsequently been located (2). This more current address listing contained different agency personnel and, frequently, different agency offices. Nine questionaires were returned on this third request.

A third follow-up questionaire, with the note used for the first follow-up, was mailed to the seven remaining agencies a month later using the newer address again. Four additional questionaires were returned for a total of 48 out of 51 agencies responding. Alaska,

District of Columbia and Mississippi did not return questionaires. Current agency addresses, provided by those states responding to the questionaire, are listed in Appendix C.

Data Processing

The responses to each question were tallied and are summarized in the Survey Results and Discussion chapter which follows. Not all questions were answered by each state and some gave more than one answer to some questions so the total number of responses vary from question to question.

Because responses to some questions may be related to a state's geography, or to their answers to other questions, some of the data were tabulated on a large chart for easier comparison. The interrelationships that were found are included in the discussion of specific questions to which they apply. In a few instances a state's answer to one question is inconsistent with their answers to others, as noted in the discussion.

CHAPTER V

SURVEY RESULTS AND DISCUSSION

1. DO YOU WISH TO RECEIVE A SUMMARY OF INFORMATION SUBMITTED BY ALL OF THE STATES RESPONDING TO THIS QUESTIONAIRE?

   48 YES , 0 NO

There is great interest in flexible effluent standards at the state level. This interest is probably responsible for such a good response from this rather long and complicated questionaire. All states requested a summary of the information received from this survey.

2. HAS YOUR STATE BEEN DELEGATED RESPONSIBILITY FOR ISSUING NPDES PERMITS?

   34 YES , 14 NO

Of the 50 states and District of Columbia, 35 are delegated and 16 are non-delegated. Five of the non-delegated states are in the southwest and four are in the northeast part of the country. The rest of the states don't form any noticeable pattern (see Figure 1).

3. IDENTIFY THE TYPES(S) OF FLEXIBLE STANDARDS USED BY YOUR AGENCY:

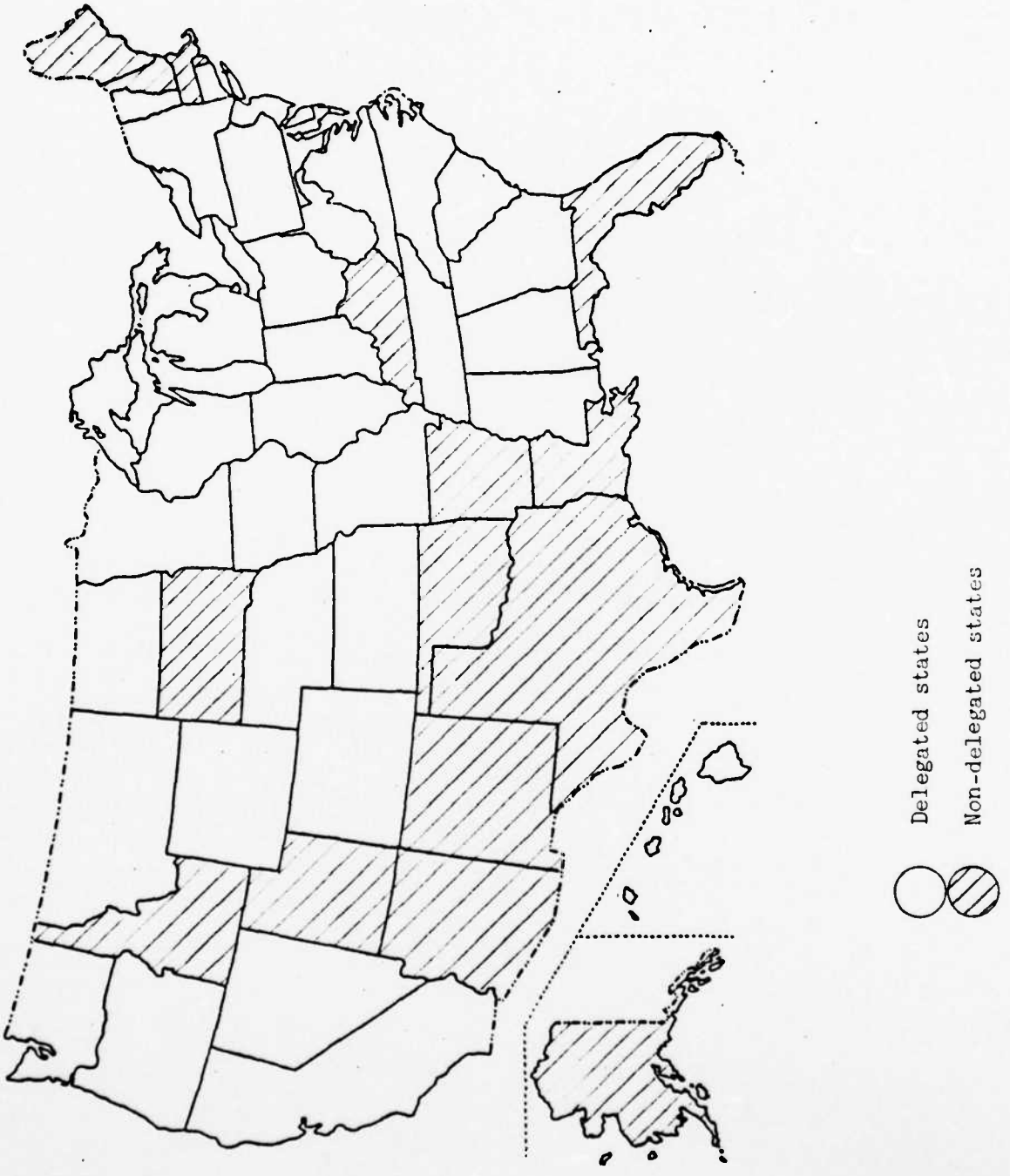
   42 Seasonal effluent standards

   14 Monthly effluent standards

   25 Hydrologic controlled releases of effluent

FIGURE 1

EPA DELEGATION TO ISSUE NPDES PERMITS



__5__ Continuously variable standards

__5__ We do not use flexible standards

__0__ Others (please explain):

This question was designed to explore the types of flexible standards being used, as well as to inform the agency about what was included in the term "flexible standard". The results show that 42 of 48 states responding use seasonal effluent standards. Five states; Texas, Arizona, Nevada, Utah and New Hampshire; reported not using flexible standards. New Hampshire, however, reported using seasonal effluent standards (in their answer to question 11) in permits for both POTWs and industries (from their answer to question 13). Utah allows ammonia (from question 9) to vary in effluent from two POTWs (from question 14). Thus, the only states not using any flexible standards are in the arid southwest - Arizona, Nevada and Texas. Utah, New Mexico and California, which are also in this area, indicated in their answers to questions 8 and 14 that they very seldom use flexible standards.

In the 1979 survey, 18 of the 39 states responding were not using seasonal standards (14). Comparison of those results with the present data shows a significant move by state agencies, or EPA for non-delegated states, to allow at least some use of flexible standards. Both Alaska and Mississippi, who did not respond in the present survey, were using seasonal standards in 1979 (the District of Columbia did not respond to either survey). Since no other states have stopped using seasonal standards, it is probably reasonable to assume these two still use them also.

4. HOW IMPORTANT, IN THE VIEW OF YOUR AGENCY, ARE THE FOLLOWING POTENTIAL BENEFITS OF FLEXIBLE STANDARDS?

Very Impt.	Less Impt.	Not Impt.	Potential Benefit
26	17	5	More rational -- easier to defend
29	13	5	Reductions in plant capital expenditures
31	14	1	Reduction in plant operating costs
24	19	4	Reduction in energy consumption
10	19	16	Reduction in No. of standards violations
12	21	13	Improved relations with dischargers
3	0	0	Others (please explain):

The answers indicate that reduction of treatment plant operating costs and capital expenditures are the most often recognized benefits of flexible standards. The potential for reduced energy consumption and logic behind flexible standards were nearly as important to the agencies. The states that answered that those four potential benefits were not important were usually those that reported using flexible standards infrequently in answering question 8. However, some states that infrequently or never use flexible standards felt those four potential benefits were very important. Other potential benefits of flexible standards that were reported as very important by specific states were:

- Colorado: "It produces refinements in the system which allows the field to grow and is a motive force for positive change. The increased attention to detail is prerequisite and fundamental to a proper understanding of any situation."

- Indiana: "Taking advantage of the seasonal assimilative capacity of streams without degradation."

- Rhode Island: "More applicable to specific conditions."

5. HOW IMPORTANT, IN THE VIEW OF YOUR AGENCY, ARE THE FOLLOWING POTENTIAL DISADVANTAGES OF FLEXIBLE STANDARDS?

Very Impt.	Less Impt.	Not Impt.	Potential Disadvantages
14	23	9	More paperwork may be required
21	18	8	More agency monitoring is needed
14	24	7	More discharger monitoring is needed
20	17	11	More agency personnel are needed
25	16	6	Setting standards is more complicated
6	26	16	More difficult to explain to dischargers
14	20	9	Decrease in stream water quality at times
5	23	13	Poorer relations with the public
2	0	0	Others (please explain)

Many state agencies feel that the major disadvantages of flexible effluent standards have to do with the increased demands on the agency. They view flexible standards as more difficult to establish, requiring more agency monitoring and requiring more agency personnel. Interestingly, the states that reported using flexible standards most frequently (when answering question 8) also reported that these disadvantages were not important. This suggests that once a state is accustomed to using flexible standards, its workload is not significantly greater than with fixed level standards. Additional very important disadvantages in the view of two agencies are:

- Nevada: "Flexible standards are not necessarily in accord with the goals of the Clean Water Act."

- Washington: "Flexible standards are contrary to the state requirement for all known, available, and reasonable treatment regardless of receiving water quality."

6. IF YOUR AGENCY DOES NOT ISSUE FLEXIBLE STANDARDS, CHECK ALL ANSWERS THAT APPLY:

3(2) We have never used flexible standards

4(1) We have not seriously considered adopting them

5(3) We have considered the possibility for using them

6(2) We are now considering their feasibility

3(1) We plan to use flexible standards in the future

0(0) We do not plan to use them in the future

6(2) We are uncertain about future use of flexible standards in our program

0(0) We have used flexible standards in the past, but no longer do (Please explain reasons for the change)

Nine states that use flexible standards answered this question in addition to the states not using flexible standards. Some states that answered the question don't use flexible standards very often and others apparently don't consider seasonal standards as being a type of flexible standard. The results from Arizona, Nevada and Texas are in parentheses so they can be interpreted separately from the results of other states responding. All three have considered using flexible standards and none has ruled out the possibility that they may use them in the future. In fact, Nevada responded that they plan to use flexible standards in the future. Only Arizona has not seriously considered adopting them.

7. IF YOUR AGENCY DOES NOT USE FLEXIBLE STANDARDS, PLEASE CHECK REASONS THAT APPLY TO YOUR SITUATION:

1(0) Our climate does not favor use of flexible standards

1(0) There isn't enough demand on assimilative capacity of our streams to justify using flexible standards

4(1) All of our dischargers can meet current standards without resorting to flexible ones

4(0) We don't feel that there is enough benefit from flexible standards to warrant their use in this state

7(1) We feel that our manpower and financial resources are inadequate for implementing them

2(1) We do not feel that flexible standards are compatible with effective stream pollution control

2(1) Other (please explain):

The responses from the states that don't use flexible standards are in parentheses, as they were in question 6. When all responses are considered, the primary reasons for not using more flexible effluent standards are inadequate agency manpower and financial resources. This correlates well with the responses to question 5 where the major disadvantages of flexible standards are felt to be the increased demands on the agency. Two states replied that the issue of flexible standards hadn't been pushed yet in their states.

8. OF THE PERMITS NOW BEING ISSUED BY YOUR AGENCY, WHAT PERCENT INCLUDE FLEXIBLE EFFLUENT STANDARDS?

2 We always issue flexible standards (virtually 100%)

2 We usually issue flexible standards (more than 70%)

14 We often issue flexible standards (30-70%)

26 We seldom issue flexible standards (less than 30%)

5 We never issue flexible standards (always require fixed, single level effluent standards)

This question attempted to find out how frequently states are now issuing flexible standards. These results, which are displayed in

Figure 2, may be much different from the results of question 14 which tries to determine the total number of dischargers that now have flexible standards. An agency could issue flexible effluent standards for nearly all permits presently coming up for consideration but have fewer than half of their dischargers currently using them.

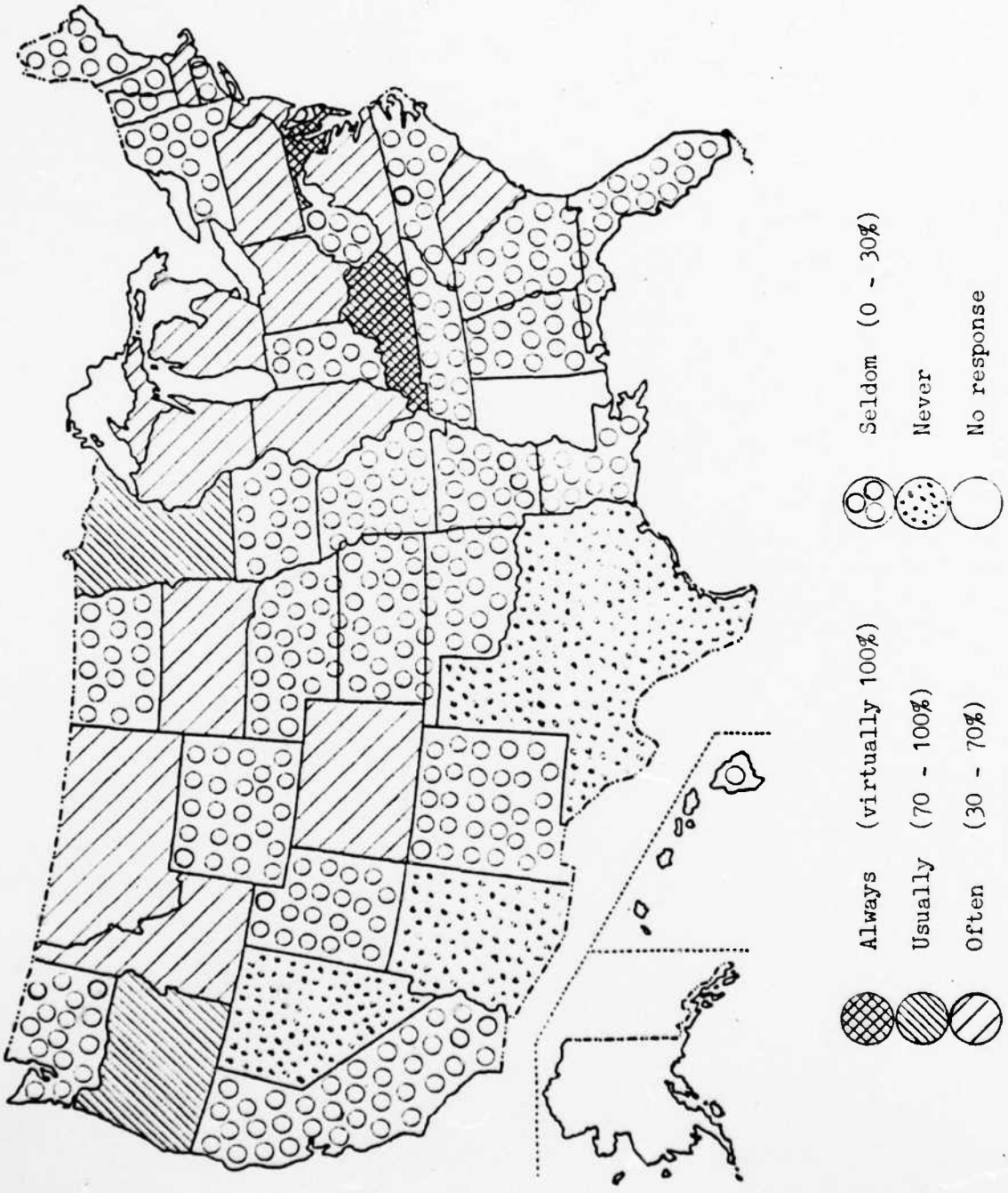
Maryland and Kentucky report that they issue flexible standards almost all of the time. Kentucky allows seasonal variation for only one wastewater constituent, ammonia nitrogen, according to their answers to questions 9 and 11. Maryland allows BOD, ammonia nitrogen and fecal coliform to vary but only for non-industrial dischargers (from answers to questions 9 and 13).

Oregon and Minnesota report that they issue flexible standards at least 70% of the time and will issue them for both industrial and non-industrial dischargers according to their answers to question 13. The results from question 9 show that Oregon allows flexibility for BOD and suspended solids while Minnesota allows flexibility for BOD, ammonia nitrogen and fecal coliforms. Massachusetts and Connecticut, which issue flexible standards 30-70% of the time, allow six different constituents to vary and allow flexibility for both industrial an non-industrial dischargers (according to questions 9 and 13). These four states may actually use flexible standards in more circumstances than Maryland or Kentucky.

When answering this question Iowa and Missouri indicated that they never use flexible standards. Both said they used seasonal effluent standards when answering questions 3 and 11 so they must not consider seasonal standards to be a type of flexible standard. In Figure 2 these states are considered as seldom using flexible standards.

FIGURE 2

DEGREE TO WHICH FLEXIBLE STANDARDS ARE PRESENTLY USED



9. FOR WHICH OF THE FOLLOWING WASTEWATER CHARACTERISTICS DOES YOUR AGENCY ISSUE FLEXIBLE STANDARDS?

32	BOD		
18	Suspended Solids		
0	Color		
36	Ammonia Nitrogen	4	Nitrite/Nitrate Nitrogen
16	Fecal Coliforms	5	Total Coliforms
20	Others (please identify):		

The other characteristics identified by some states are:

6	Phosphorus	1	pH
4	Temperature	1	Organic Nitrogen
3	TKN	1	Turbidity
2	Residual Chlorine	1	Metals
1	Sulfates		

The most noticeable aspect of data received from this question was the many combinations of constituents allowed to vary. This illustrates how local conditions and agency direction vary from one state to the next. Even in non-delegated states, where EPA does the permitting, there is a large difference in the constituents that are permitted to vary. There doesn't seem to be any distinct geographical distribution. States that allow three or more constituents to vary tend to be the more northern states but many northern states only allow one or two constituents to vary.

Table 1 summarizes which states allow flexibility for each of the most commonly reported wastewater constituents. Twenty-three of the states using flexible standards allow their use for only one or two constituents. Twelve allow flexibility for four or more constituents.

TABLE 1 - WASTEWATER CONSTITUENTS ALLOWED FLEXIBILITY BY THE STATES

State	BOD	Suspended Solids	Ammonia	NO_3	Coliforms Fecal	Coliforms Total	Phosphorus	Temperature
Alabama	X		X					
Arkansas	X		X					
California	X	X	X					
Colorado			X					
Connecticut	X	X	X	X	X	X	X	
Delaware	X		X					
Florida	X	X	X	X				X
Georgia	X		X					
Hawaii	X	X						
Idaho	X	X	X		X			X
Illinois			X					
Indiana	X	X	X		X			
Iowa								
Kansas	X		X		X			
Kentucky			X					
Louisiana	X							
Maine	X				X			X
Maryland	X		X		X			
Massachusetts	X	X	X		X	X	X	
Michigan	X		X		X			
Minnesota	X		X		X			
Missouri					X			
Montana		X	X		X			
Nebraska					X			
New Hampshire	X	X	X			X		
New Jersey	X	X	X				X	
New Mexico			X				X	
New York	X	X	X		X	X		
North Carolina	X		X					
North Dakota	X	X	X					
Ohio	X	X	X		X			X
Oklahoma					X	X		
Oregon	X	X						
Pennsylvania			X				X	
Rhode Island	X	X	X	X				
South Carolina			X					
South Dakota	X		X					
Tennessee	X		X					
Utah			X					
Vermont	X		X					
Virginia	X		X	X				
Washington	X	X	X				X	
West Virginia	X	X						
Wisconsin	X	X	X					
Wyoming			X		X			

10. YOUR AGENCY ISSUES FLEXIBLE STANDARDS TO PLANTS DISCHARGING INTO WHICH OF THE FOLLOWING TYPES OF WATERCOURSES?

19 All watercourses

4 All rivers and streams

6 Only selected river basins

15 Only designated segments of streams

2 Lakes 0 Wetlands 0 Estuaries

1 Ocean 4 Others (please identify):

Other choices written in by individual states are:

- Colorado: "Essentially wherever the data is sufficient to document the justification."

- Indiana: "As determined by waste load allocation."

- Vermont: "Selected segments of selected river basins."

- Washington: "Streams not meeting water quality standards."

The results show that 23 states permit flexible standards for all rivers and streams or all watercourses. States, such as Kentucky, Maryland and Minnesota, that reported using flexible standards frequently in questions 8 and 14 allow their use on all watercourses. Oregon also frequently uses flexible standards and allows their use by dischargers on all rivers and streams. Quite a few states, however, that allow flexible standards for all watercourses do not have many dischargers using them. This would seem to indicate that there is potential in those states for increased use of flexible standards.

States that restrict the use of flexible standards to certain designated streams often were the same states that reported in question 14 to have relatively few dischargers using them. They may not be using flexible standards frequently because many of the dischargers are

not on one of the designated stream segments.

States with widely differing geography permit flexibility of discharges to all watercourses apparently without harm to these watercourses. Alabama, Florida and Georgia, which may not have the low winter water temperatures of many other states, allow flexible standards to be used on all watercourses. This use by temperate states should encourage some other states, with greater seasonal temperature variability, to reexamine their more restrictive procedures.

11. WHEN YOU ISSUE FLEXIBLE STANDARDS, HOW ARE THE PERMISSIBLE CHANGES IN EFFLUENT QUALITY DEFINED?

30 A. The year is divided into two or more "seasons" that change on the same dates each year. Fixed standards then are issued for each season.

If so, do your "seasons" vary among different dischargers? YES 12 NO 20

What calendar periods are used in your state for defining those seasons?

13 B. Different standards are set for each of two or more "seasons", which change from year to year in response to certain environmental variables (stream flow, temperature, etc.), without regard to calendar dates.

Which variable(s) do you use?

16 C. Discharge standards are allowed to vary more or less continuously in response to environmental variables (stream flow, temperature, etc.), without regard to calendar dates.

Which variable(s) do you use?

For the sake of brevity and clarity each category of flexibility listed will be referred to by the letter in front of it - A, B or C. Each category will be discussed individually after a general discussion.

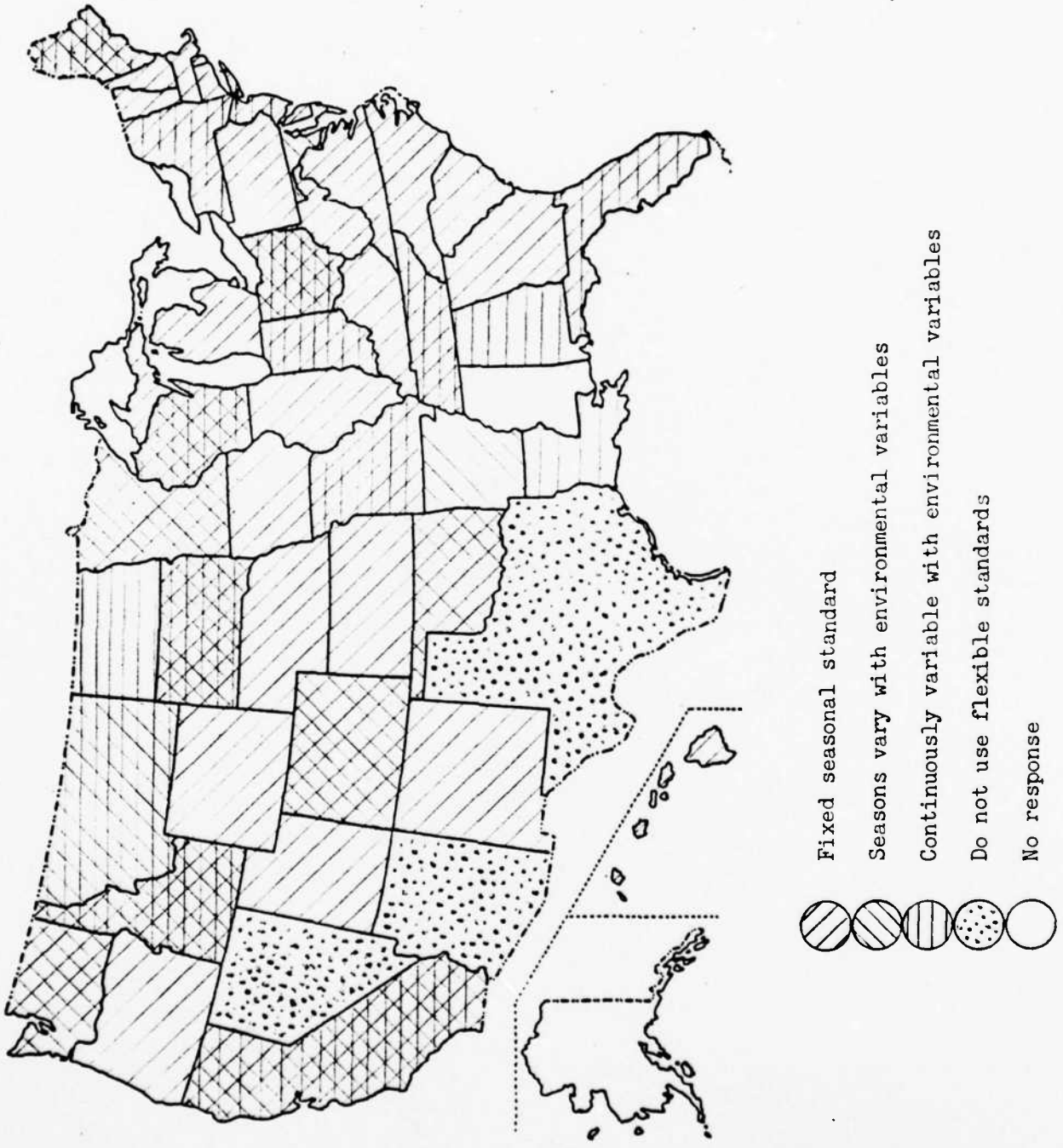
This question was an attempt to separate states into three groups based on the degree of flexibility they allow. Many states, however, use more than one type of flexible standard. Figure 3 illustrates the states which utilize each category of flexibility. Four states use both A and B, one state uses both B and C, five states use both A and C, and six states use all three types of flexible standards described. Only six states use B and/or C without using A. Most states did not describe how they utilize their particular combination of standards. There is no indication that states use different degrees of flexibility for different classes of discharger (i.e. POTW, industry). They seem to use different types of flexible standards to regulate different constituents in the wastewater. A discharger, therefore, may deal with several different types of flexible effluent standards for one waste stream. For example: Connecticut allows BOD, suspended solids, ammonia nitrogen, and NO_3-nitrogen to vary monthly. Phosphorus and chlorination for coliforms have winter and summer seasons. The summer season is May 1- Sep 30 for chlorination and May 15 - Aug 31 for phosphorus. Tennessee uses fixed winter and summer seasonal effluent standards for ammonia nitrogen while their standard for BOD varies more or less continuously with stream flow.

A. For states that change "seasons" on the same dates each year there is a wide variation of dates used. The number of states that designated each "season" are:

1 Mar-Oct, Nov-Feb
7 Apr-Oct, Nov-Mar
1 Apr-Nov, Dec-Mar
1 Apr 15-Oct 15, Oct 15-Apr 15
5 May-Sep, Oct-Apr
7 May-Oct, Nov-Apr
2 May-Nov, Dec-Apr
1 May 15-Aug, Sep-May 15

FIGURE 3

TYPE OF FLEXIBLE STANDARD(S) THE STATES USE



2 Jun-Sep, Oct-May
1 Jun 15-Sep 15, Sep 15- Jun 15
3 Summer, Winter
1 Pineapple canning season (Hawaii)
2 Dates vary with stream location
2 Four seasons per year (no dates given)
2 Monthly

Thirty-four states use the approach of having two fixed seasons each year. These states may feel that the ease of managing two seasons more than makes up for the increased benefits that could be realized by using more than two seasons. Many states feel, as seen from the results of question 5, that the increased agency workload and the complexity of flexible standards are major disadvantages. Florida and Michigan use four seasons each year even though they feel (in question 5) the increased workload and complexity are important. They evidently must feel that the benefits of having two additional seasons outweigh the disadvantages. Connecticut and Georgia use flexible effluent standards that vary each month. Neither of them feel (in question 5) that the potential disadvantages of increased complexity and agency workload are important. Perhaps there are not as many problems with developing and operating monthly standards as many states perceive. The additional savings possible may be well worth a little more effort that may be needed.

B. Thirteen states use standards set for seasons that vary from year to year in response to environmental variables. The number of states responding and the variables they measure are:

10 Stream flow
9 Stream temperature
2 Stream pH
2 Fish spawning periods
1 Background NH_3

By far the most common environmental variables used for determining

seasons were stream flow and temperature. Seven states use both stream flow and temperature.

C. Sixteen states allow standards to continuously vary in response to environmental variables. Three states - Alabama, Louisiana and North Dakota - use only this type of flexible standard. The number of states responding and the variables measured are:

10 Stream flow
5 Stream temperature
1 Chlorophyl a
1 Fish spawning periods
1 Dissolved oxygen
1 Tide
1 Stream pH
1 Total dissolved solids

Stream flow is the criterion most commonly used in establishing the continuously variable standard. Three states use both stream flow and temperature. New York uses stream flow, stream temperature, stream pH and dissolved oxygen.

12. WHAT FACTORS USUALLY ARE CONSIDERED SPECIFICALLY BY YOUR AGENCY IN SETTING FLEXIBLE STANDARDS? (check all that apply)

13 Stream flows (estimates only)

30 Stream flows (statistical analyses of records)

12 Stream flow is specified in the standard

How do you select the specific stream flows used in setting your standards (for example, $_{7}Q_{10}$ etc.)?

19 Estimated stream temperatures

22 Recorded stream temperatures

6 Stream temperature is specified in the standard

How do you select the specific stream temperatures used in setting standards?

18 Recreational activities

6 Commercial harvesting of aquatic life

3 Others (please explain):

Stream flow was the factor considered by the most states when setting flexible effluent standards. Ten states use both estimates and historical records with estimates being used on streams where flow data are not available. The most frequently used historical record values (used by 25 states) were the minimum flows occurring for seven consecutive days in ten years (7Q10). Six states - Colorado, Michigan, Minnesota, New Jersey, North Carolina and Virginia - said they use seasonally adjusted 7Q10. This is apparently the seven day, ten year minimum flow individually calculated for each season. Connecticut, Delaware, Georgia and New Mexico reported that they use a "monthly 7Q10". Georgia describes this as "the lowest seven consecutive day stream flow that will recur once in ten years for any month of the year" (34). Stream flows utilized by other individual states are:

- Ohio: "Have used 7Q10 historically - am in process of changing to 30Q10."

- Oklahoma: "7Q2 flow."

- Michigan: "Most restrictive monthly 95% exceedance flow for discharger season used."

- California: "Selected on a case by case basis."

Stream temperatures are used by many states in setting flexible effluent standards. Nine states use both estimates and recorded data with estimates being used where data aren't available. The number of responses and methods of selecting specific temperatures in setting standards are:

4 USGS records
3 Ammonia toxicity

3 Stream type and sensitivity of organisms being protected
2 90th percentile of recorded temperature
2 Average monthly temperature
1 Projected worst case situation

Recreational activities are considered in 18 states when setting flexible effluent standards. These activities usually determine the chlorination season for states with flexibility for fecal and/or total coliforms. Oregon, South Dakota, Washington and West Virginia consider recreational activities but did not claim to use flexibility for fecal or total coliforms when answering question 9. They apparently consider recreational use when regulating the discharge of other wastewater constituents.

Other factors considered by some states when setting flexible effluent standards were written in. Kansas and Kentucky said stream pH was utilized in calculating unionized ammonia concentration. Idaho stated that beneficial uses must be protected before they will set flexible effluent standards. This undoubtedly would apply to all the other states also. The primary concern of state agencies, as evident from their responses, is that water quality be maintained throughout the year. Effluent standards are all developed with this concern in mind.

13. IN YOUR STATE, WHICH OF THE FOLLOWING TYPES OF DISCHARGERS ARE ELIGIBLE TO RECEIVE FLEXIBLE STANDARDS? (check all that apply)

43 Municipal dischargers

37 Non-municipal dischargers

33 Industrial dischargers

27 Other non-municipal dischargers

4 Only dischargers that request flexible standards

__0__ Only dischargers that can demonstrate economic benefits

__0__ Others (please explain)

The data from the states answering this question are listed in Table 2. It should be kept in mind that industrial and other non-municipal dischargers are considered here as sub-categories of non-municipal dischargers. Montana and New Hampshire did not indicate whether the non-municipal dischargers they allow to use flexibility are industrial and/or other non-municipal dischargers.

The results indicate that states are more likely to write flexible effluent standards for municipal dischargers than non-municipal dischargers. Only Louisiana writes flexible standards for industry but not for municipalities while at least nine states allow flexibility for municipalities but not for industry. At least 13 states allow flexibility for municipalities but not for the category of other non-municipal discharger which includes government and privately owned conventional waste treatment plants. Seven states allow flexibility for municipal dischargers but not for either category of non-municipal discharger. Each of these seven states reported having fewer than 12 municipal dischargers on flexible standards in question 14. This may indicate that municipal dischargers are the first to receive flexibility in many states but as use of flexibility increases within a state other dischargers are included.

Only Arkansas, Delaware, New Jersey and North Carolina answered that they issued flexible standards only to dischargers requesting them. This implies that most states are issuing flexible standards where local conditions will allow them without the discharger neces-

TABLE 2 - DISCHARGERS ELIGIBLE FOR FLEXIBLE STANDARDS

State	Municipal	Non-municipal		
		Total	Industry	Other
Alabama	X	X	X	X
Arkansas	X			
California	X	X	X	X
Colorado	X	X	X	X
Connecticut	X	X	X	
Delaware	X			
Florida	X	X	X	
Georgia	X	X	X	X
Hawaii	X	X	X	X
Idaho	X	X	X	X
Illinois	X	X	X	X
Indiana	X	X	X	
Kansas	X	X	X	X
Kentucky	X	X	X	X
Louisiana		X	X	
Maine	X	X	X	X
Maryland	X	X		X
Massachusetts	X	X	X	
Michigan	X	X	X	X
Minnesota	X	X	X	X
Missouri	X	X	X	X
Montana	X	X		
Nebraska	X	X		X
New Hampshire	X	X		
New Jersey	X	X	X	X
New Mexico	X			
New York	X	X	X	X
North Carolina	X	X	X	X
North Dakota	X			
Ohio	X	X	X	
Oklahoma	X	X	X	X
Oregon	X	X	X	X
Pennsylvania	X	X	X	X
Rhode Island	X	X	X	X
South Carolina	X	X	X	X
South Dakota	X	X	X	X
Tennessee	X	X	X	X
Utah	X			
Vermont	X			
Virginia	X	X	X	X
Washington	X	X	X	
West Virginia	X			
Wisconsin	X	X	X	
Wyoming	X	X	X	X

sarily having to ask for them. North Carolina mentioned in answering question 18 that they are considering dropping the requirement for dischargers to request flexible standards.

14. PLEASE SUPPLY THE FOLLOWING INFORMATION ABOUT DISCHARGERS IN YOUR STATE:

How many dischargers are located in your state?

Municipal ____ Non-municipal ____

Industrial ____

Other non-municipal ____

How many dischargers currently have flexible effluent standards?

Municipal ____ Non-municipal ____

Industrial ____

Other non-municipal ____

Eleven states either gave no numbers at all or didn't provide any numbers for the dischargers using flexible standards. Table 3 gives the results received from the rest of the states. A few states - Illinois, Kentucky, Oregon, Wisconsin, and possibly a few others - stand out as frequently utilizing flexible effluent standards. Twenty-one of the 37 states listed have 50 or fewer dischargers using flexible standards. Twelve states have ten or fewer dischargers on flexible standards. This points out that even though 45 of the states use flexible standards there is a very large variance in how frequently they are used. Four states are credited with using flexible standards even though only two dischargers in each have flexibility.

California, Indiana and Michigan indicated in question 13 that

TABLE 3 - NUMBER OF DISCHARGERS IN EACH STATE, BY CATEGORY

State	Total Dischargers				Dischargers With Flexible Standards			
	POTWs	non-POTWs			POTWs	non-POTWs		
		Total	Industry	Other		Total	Industry	Other
Arizona	100	50	20	30	0	0	0	0
Arkansas	300	500			10	0	0	0
California	328	1248			4+	0	0	0
Colorado	500	400	250	150	150		75	
Connecticut	89	643	598	45	13	2	2	0
Delaware	45	75			2	0	0	0
Florida	4400		2100		1		1	
Georgia	400	750	500	250	30	12		
Illinois	750	2250	1500	750	375	1125		
Indiana	450	715	620	95	50	0		
Kansas	700		300	150	10	5	5	0
Kentucky	257	3117	892	2225	190	1647	1	1646
Louisiana	3000	1500	1200	300	0		4-5	
Maryland	200			200	100		0	100
Michigan	400	50			50	0	0	0
Missouri	600	2100	300	1700	30	500	80	400
Montana	150	250			100	50		
Nebraska	287	154	72	82	56	6	0	6
Nevada	75	75			0	0		
New Hampshire	75	75			5	10		
New Jersey	400	1100	1000	100	30	20		
New Mexico	69	68	68		2	0	0	0
New York	550	6722	1501	5221	50	55	55	0
North Carolina	349	2045	98	1410	25	44	5	39
Ohio	1000	1100	1100	158	all should or will			
Oregon	240	463	400	63	220	200		
Rhode Island	30	150	150	0	7	35	35	0
South Carolina	330	1035			438 total			
South Dakota	300	100	50	50	75	10	2	8
Texas	2257		878		0		0	
Utah	90	25			2	0		
Vermont	100		110		2		0	
Virginia	1000	1000	1000		20	300	300	
Washington	270	530	470	60	10-15	10-15	10-15	
West Virginia	150	2500			10	0	0	
Wisconsin	568	1000	1000		250	100	100	
Wyoming	100	700	600	100	75	50	10	40

non-municipal dischargers were eligible to receive flexible standards but their answers here revealed there were none currently on flexible standards. Perhaps more of these dischargers will receive flexible effluent standards in the next few years when their NPDES permits come up for renewal.

15. IF POSSIBLE, PLEASE ESTIMATE THE 1982 SAVINGS, IF ANY, REALIZED IN YOUR STATE THROUGH USE OF FLEXIBLE STANDARDS.

__3__ Estimated values

__2__ Based on studies

	1982 Savings	Total $ Spent
Municipal Capital	$_____	$_____
Municipal Operating	$_____	$_____
Other Capital (Identify)	$_____	$_____
Other Operating (Identify)	$_____	$_____

Apparently only New Mexico has done a state wide study to determine savings from use of flexible effluent standards. They claim an operating cost savings of $220,000 during 1982 in their two POTWs on flexible standards. This savings was accomplished by permitting flexibility only for ammonia and phosphorus (as reported in question 9).

Georgia estimates their 30 municipalities can save $50 million in capital costs and $4.2 million in annual operating costs by using monthly flexible effluent standards. This estimate is based on a study of some of the municipal dischargers in the state (34). Georgia reported allowing flexibility for BOD and ammonia nitrogen when answering question 9.

Three states estimated their savings from the use of flexible

effluent standards. Colorado estimated a savings to 150 POTWs using flexible standards of $1 million in capital and operating costs during 1982. They permit flexibility only for ammonia. South Dakota estimates a savings of over $1 million (of $12 million spent) in POTW capital costs during 1982. They permit flexibility for BOD and ammonia. No estimate of operating cost savings was provided. Missouri estimated an operating cost savings of $150,000 for 30 POTWs with flexible standards for fecal coliforms. This averages to a $5,000 savings per POTW.

The states that estimate savings seem to report a much smaller savings per discharger than those who have done studies. State agencies may not fully realize the savings potential of flexible standards. Since only five states responded to the question, most states apparently do not know the savings from using flexible standards in their state or else are reluctant to hazard a guess. No state even estimated the savings for dischargers other than POTWs. Since the state agencies claimed that the major benefit of flexible effluent standards is the monetary savings, it seems that more states would know at least approximately what that savings is. These figures should be valuable to the states in justifying either the use or non-use of flexible standards within their state. Savings in one state or one part of a state may be quite different from those in other areas because of differences in local conditions.

16. WHAT DO YOU EXPECT TO BE THE FUTURE (say three years hence) POLICY OF YOUR AGENCY WITH RESPECT TO USE OF FLEXIBLE STANDARDS?

    3 Much greater use of flexible standards

    25 Somewhat greater use of flexible standards

    19 Little or no change from our present practice

__2__ Somewhat less use of flexible standards

__0__ Much less use of flexible standards

The results of this question are displayed in Figure 4.

As noted in the discussion of question 3 the past trend has been for states to increase their utilization of flexible standards. The results from this question indicate a continued interest in expanding the use of flexible standards. Twenty-eight states expect to increase their use of flexible standards in the future. This category includes Arizona, Nevada and Texas, which do not now use flexible standards. Nineteen states have indicated that they don't plan to significantly change their use of flexible standards.

Illinois and Rhode Island indicated that they expected to use flexible standards somewhat less in the future. In answering question 17 Rhode Island indicated that environmental groups were causing the public to desire more strict standards. This could well be the reason why they expect to use less flexibility in the future. Illinois did not give any indication of their reasoning.

17. HAVE ANY INTEREST GROUPS IN YOUR STATE OBJECTED TO YOUR POLICIES CONCERNING FLEXIBILITY IN STANDARDS (wishing either more or less flexibility)?

__34__ NO __10__ YES

How many complaints?

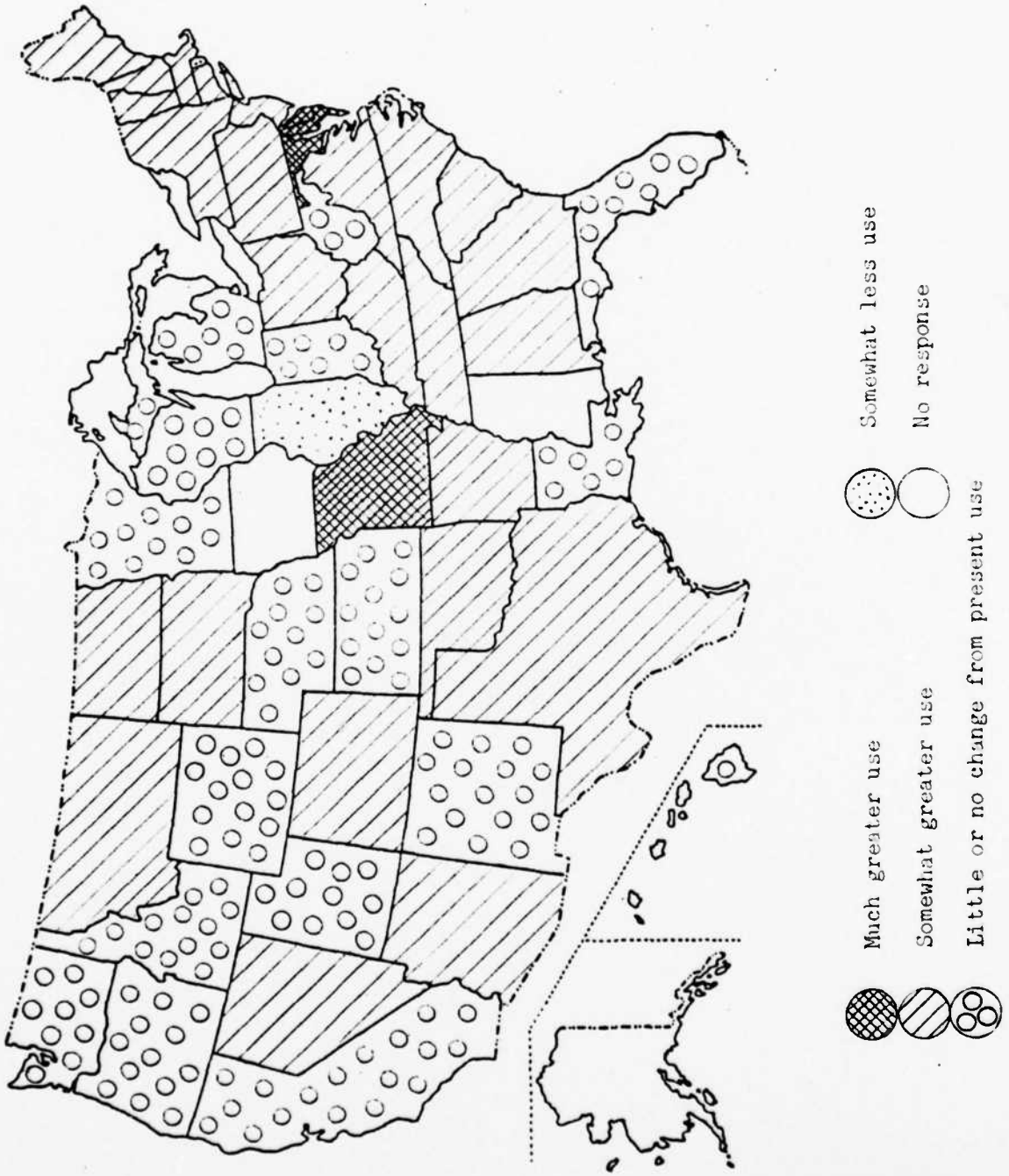
Identify their major objections:

Identify specific groups, or types of groups involved:

Have those pressures affected structures of laws and regulations in your state? (please explain)

FIGURE 4

EXPECTED FUTURE USE OF FLEXIBLE STANDARDS



A summary of the answers from the responding states is followed by a discussion of the results.

- Colorado: Many complaints have been received from major dischargers desiring greater flexibility. Their pressure encouraged changes that were made in the state statute.

- Connecticut: Several coastal municipalities have sought relief from year around chlorination. These pressures have not caused any change in policy so far.

- Florida: Power plants and phosphate companies desire greater flexibility.

- Massachusetts: Watershed associations feel that flexibility in standards is going "backwards" in pollution abatement.

- New York: Long Island shellfishermen have complained about New York City not using disinfection in the winter.

- Oklahoma: Environmentalists feel flexibility in standards allows too much pollution. Dischargers feel they result in too much paperwork. These complaints have not resulted in changes in laws or regulations.

- Pennsylvania: Industries and some of the larger municipal dischargers wish to use flexible standards because of the capital and operating cost savings. This pressure has not caused any change so far but regulation changes are anticipated in the future.

- Rhode Island: Environmental groups desire more stringent standards. Their pressures tend to lead to a more stringent public philosophy.

- Texas: Large municipalities have asked that we consider using flexible standards. We are presently considering the issue.

Four states report that groups have attempted to decrease the use of flexible standards. Five states report that dischargers have expressed their desire to use flexible standards. One additional state indicated that a group objected to the state's policy on flexible standards but did not describe the objection or the group. It seems remarkable that only ten states, of 48 returning the questionaire, received complaints on using flexible standards either too often or too infrequently. If this represents the actual situation, flexible

standards as presently used are being accepted quite well. There seems to be a little more pressure to increase the use of flexible standards than to decrease their use. From the answers received, neither pressure for more or less use of flexible standards appears to have much effect on changing laws and regulations.

18. PLEASE OUTLINE ANY PROBLEMS THAT YOU HAVE ENCOUNTERED WITH FLEXIBLE STANDARDS WHICH SHOULD BE CONSIDERED CAREFULLY BY OTHERS USING OR PLANNING TO USE THEM.

Fifteen states answered this question. Their answers are listed, followed by a discussion of the results.

- Colorado: "Having sufficient data on quality or quantity on a given stream segment. Having sufficient resources to acquire the data and analyze it."

- Kansas: "NH_4 toxicity information from EPA is too severely limiting for our warm waters. Distributing loading between various existing and planned plants is difficult and limited parties object."

- Kentucky: "No significant problems."

- Massachusetts: "When evaluating seasonal BOD, the historical variation in flow presents problems; must provide reasonable margin of safety. Phosphorus limitations are always a problem due to algal growth dynamics in streams. Usually, data limited."

- Montana: "More difficulty in enforcement - more monitoring required."

- New Jersey: "Data availability or defensible data information is always a problem in using flexible standards. To solve this we usually require the applicants to meet year around limitations, until sufficient data is provided by the applicants."

- New Hampshire: "We use a straight-forward, clear-cut approach, utilizing intensive stream investigation and Qual-II water quality model to determine 'assimilative capacity' under 7Q10 conditions only... no monthly or flow variable pollutant loadings are determined or permitted. As the regulatory agency, we are not willing to engage in academic bantering Re: model input parameters, variables and coefficients. Use some water quality modeling and professional judgement in allowing some increased

pollutant loading during the winter season on a case-by-case basis. Distrust or lack of reliable water flow and temperature data gathered by industry, and lack of ability on the part of the state to adequately monitor the discharge, lead to problems. Our approach is simplistic and admittedly conservative, but we have neither the staff nor capabilities to develop and monitor flexible permits."

- New York: "To ensure consistency, prepare written criteria."

- North Carolina: "Our current regulation requires that the discharger must request seasonal standards and winter standards must not exceed double the summer standard. We are considering changes to the regulation to drop these two restrictions."

- Ohio: "Must have good data base."

- Pennsylvania: "Difficulties in establishing broad based simplified approaches. Site specific analysis needed for true scientific, technical basis which requires more and highly trained analysts. Depending on the level of sophistication needed for justification, seasonal model calibration/validation may be necessary - a costly and time consuming activity."

- South Carolina: "Difficulty in estimating stream flows, velocities and temperatures at various times of the year."

- South Dakota: "Intensive stream surveys required to initially gather data are expensive and time consuming. Wasteload allocation reports and follow-up surveys are also time consuming."

- Tennessee: "We have established BOD limit based on flow for a discharge located immediately below a dam. The problem was with documentation of the flow. This was resolved by telemetry of flow data to the industry and recording at that point."

Most states answering this question feel the major problem in in using flexible standards is obtaining good data. Obtaining good stream flow, temperature and constituent data is considered to be expensive and time consuming. Tennessee solved part of the problem by having the industry record flow data using telemetry.

19. PLEASE OUTLINE ANY OF YOUR EXPERIENCES OR METHODS THAT MIGHT BE HELPFUL TO OTHERS IN IMPLEMENTING OR SOLVING PROBLEMS IN USING FLEXIBLE STANDARDS.

Seven states answered this question. Their answers are listed, followed by a discussion of the results.

- Colorado: "Outline a scope of work with the discharger for site specific situations with funding by the discharger for the study. Approve the scope of work and stipulate a procedure for considering the results either in the permit or as an attachment. Review and approve/disapprove the results."

- Florida: "Place burden on applicant for discharge permit to show how he qualifies."

- Kansas: "Have good stream and plant data. Start now in gathering for future use where problems are anticipated or even possible."

- Massachusetts: "Be reasonable, sensible. Collect data before and after permit issues when possible."

- New Jersey: "Set up reasonable water quality standards. Establish clear procedures and policies for implementing flexible standards. Set up technical procedures and minimum data requirements. Follow-up monitoring, if needed."

- New York: "Identify the use(s) being protected before implementing effluent standards. Water quality standards should be written explicitly so that regulator knows exactly how much flexibility is allowed the discharger to still meet the intention of the standards."

- Pennsylvania: "Management philosophy needs to be clearly established and understood inhouse. Otherwise, the tendency is to lose sight of protection of the environment to accommodate facility cost savings."

The answers from this question are an extension of the answers to the last question. Most states stressed the need to obtain good data. They also favored placing the burden of obtaining that data on the discharger.

20. WITH RESPECT TO YOUR MONITORING PROGRAM FOR INDUSTRIES AND MUNICIPALITIES, PLEASE CHECK ALL THAT APPLY:

47 Required effluent monitoring analyses and frequency are specified in all 45, or some 2, permits

37 Required stream monitoring analyses and frequency are specified in all 1, or some 35, permits

13 All monitoring is done by the dischargers

29 Most of the monitoring is done by the dischargers

4 Most of the monitoring is done by the Agency

41 Agency monitoring is usually limited to occasional checks or special studies

27 Flexible standards require more monitoring by the discharger (Slight increase 21 , Much more 5)

19 Flexible standards require more monitoring by the Agency (Slight increase 16 , Much more 3)

These results show that most states rely heavily on dischargers to do stream monitoring as well as effluent monitoring. For the most part agency monitoring is limited to occasional checks or special studies. Connecticut, Florida, Utah and Wisconsin indicated the agency did most of the monitoring. All but Utah qualified that answer by adding that they were referring only to stream monitoring. More states may have indicated this selection if the question had specified stream monitoring.

About half of the responding states indicated that they felt flexible standards required more monitoring by the discharger and/or the state agency. The states that felt much more monitoring was required are states that reported in question 8 that they seldom use flexible standards. The states that more frequently use flexible standards (as reported in question 8) feel that little or no increase in monitoring is necessary. This could indicate that as more experience in using flexible standards is acquired, states realize little additional monitoring is necessary. On the other hand states that feel much more monitoring is required may not use flexible standards often for that very reason.

CHAPTER VI

PRACTICAL IMPLICATIONS AND RECOMMENDATIONS

Although not asked in any specific question, it seems evident from survey answers that the main goal of the states is to maintain acceptable stream water quality. Most states are, at the same time, attempting to decrease expenses for the dischargers by issuing flexible effluent standards when that permits satisfactory water quality to be maintained. These two concepts should not be thought of as incompatable - in fact the goal should be to protect the environment but do so at the minimum cost.

The results of question 4 indicate the states realize that savings are possible with flexible standards, although lack of responses to question 15 indicates they may not know how much savings are possible. Other survey responses show little consensus between the states on how much flexibility to utilize. This could be due partially to differences in environmental conditions, but since no distinct geographic pattern is discernable in the responses it is more likely that the states are motivated by other factors. The result is many different methods of approaching much the same problem. While all methods may work, the techniques used by some states are certain to be more effective than others in allowing flexibility while meeting water quality goals. Many state agencies should be able to increase their use of flexible standards by utilizing techniques used successfully by other states in

implementation of their programs. From the information received in this survey there are several areas that states could use as a starting point to increase their effectiveness in using flexible standards.

1. The results of questions 8 and 14 point out that only a few states use flexible effluent standards frequently. The states that infrequently use flexible standards should be able to realize significant savings just by increasing the number of dischargers that are allowed to use them. If conditions are such that some states can frequently and successfully use flexible standards it is very likely that nearby states also could successfully increase their use. State agencies should study the techniques used by neighboring states and other states with similar conditions.

2. As discussed in question 10, part of the reason some states infrequently use flexible standards may be because they allow flexible discharges only to certain designated stream segments. About one-half of the states permit flexible standards for all rivers and streams or all watercourses and still maintain the desired water quality. The other half, that are more restrictive, could increase their use of flexible standards by allowing more streams and rivers in their state to receive flexible discharges. This would effectively increase the number of dischargers eligible for use of flexible standards.

3. As discussed with questions 8 and 9 and shown in Table 1, there is great state-to-state variation in which wastewater constituents are allowed flexibility. Some states allow flexibility for six different constituents, apparently without harm to the water quality, and yet approximately half the states allow flexibility for only one or two. The latter states could increase their savings by increasing

the number of constituents allowed flexibility. Communication with states that allow more constituents to have flexibility may provide insight into the implementation.

4. The results of question 11 show that states use many types of flexible effluent standards. While this survey did not explore the benefits of each type or even determine very explicitly how the states used each type, it seems clear that some types should result in more savings than other types. Fixed two season standards, which are the simplest form of flexible standards, were the most frequently used type but they probably do not allow the greatest savings. Georgia, which uses monthly standards, claims significantly more savings than is available with the two season standard (34). Their program certainly deserves investigation by any states desiring to use greater flexibility. Theoretically, continuously variable standards should provide the greatest flexibility since they vary directly with environmental variables (41). This survey did not explore to any extent how they are presently being utilized but they also deserve attention from those interested in increasing flexibility.

5. The answers to questions 5 and 18 express the concerns of some states, that flexible standards require more agency manpower because of the increased complexity and increased monitoring required. This may be a misperception by these states, however, since states that frequently use flexible standards do not feel (as noted in the discussion of questions 5 and 20) they are much, if any, more difficult to manage than single limit standards. States should objectively reassess their impressions of flexible standards after looking at the methods used effectively by those states frequently using them. If

they still perceive that a much greater workload is required, another solution may be in order. The results of question 20 indicate that most monitoring is being done by the dischargers. Dischargers may be willing to do even more monitoring if additional flexibility were allowed (21). Dischargers may also be willing to do more of the workload in determining how much flexibility to allow since they would benefit from the increased flexibility. Many dischargers have the expertise and desire to be involved in the standard setting process (21). The EPA or state agency would of course have to monitor the process since there would be a potential for abuse. Giving more of the workload to the dischargers should at least be considered by those states who feel overwhelmed by their workload under flexible standards.

6. The results in question 15 indicate that few state agencies know the savings in their state that result from the use of flexible effluent standards. A knowledge of the state's actual or potential savings should be invaluable to the state in planning what their future use of flexible standards should be. A thorough investigation of the savings should be done as soon as time and finances permit. Since the environmental conditions may be quite different from one state to the next it is important for each state to determine what their own savings are or could be.

CHAPTER VII

CONCLUSIONS

Frequency of Flexible Standard Use

1. Nearly all states, 45 of 48 states responding to this survey, now use some form of flexible effluent standard. Only Arizona, Nevada and Texas never use flexible standards. This is a marked increase in the use of flexible standards since 1979 when 21 of 39 states responding to a survey (14) used seasonal standards.

2. Twenty-eight of the states using flexible effluent standards use them less than 30% of the time. Only four states claim to use them more than 70% of the time. This shows a considerable potential to increase the use of flexible standards and thus provide savings to the states.

3. Twenty-eight of the responding states expect to use flexible effluent standards more frequently in the future. Only two states replied that they may use them somewhat less frequently.

Advantages and Disadvantages of Flexible Standard Use

1. Advantages perceived to be very important to states using flexible standards are:

   a. Reduction in capital expenditures

   b. Reduction in operating costs

   c. Reduction in energy consumption

   d. Use of flexible standards is rational

While few states even provided estimates of the savings that result

from using flexible standards the indications are that they are substantial.

2. States that frequently use flexible effluent standards do not feel the potential disadvantages of their use are very important. Disadvantages perceived by states that less frequently use flexible standards are that they:

a. Are more complicated to set

b. Require more agency monitoring

c. Require more agency personnel

Techniques Used in Implementing Flexible Standards

1. Twenty-three of the states using flexible standards allow their use for only one or two wastewater constituents. Twelve states allow flexibility for four or more constituents. There may be potential for additional savings in some states by allowing flexibility for more constituents.

2. About half of the states permit flexible standards for all or most watercourses and still maintain their desired water quality. The other half are more restrictive in which waterways may receive discharges on flexible standards.

3. There is a great deal of variation in the methods used by various states to set flexible effluent standards. Fixed seasonal standards are the most frequently used type of flexible standard but there is a great deal of variation in the amount of flexibility allowed even within this one category. The more flexible types of standards should be examined by states when trying to protect water quality at the least cost.

4. Most states require the dischargers to do most of the stream

monitoring as well as effluent monitoring. Dischargers may be willing to do even more to gain flexibility.

5. States seem to be more willing to issue flexible standards to municipal than industrial dischargers, at least until the state has gained experience in dealing with flexible standards.

APPENDIX A

QUESTIONAIRE WITH COVER LETTER

THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

The School of Public Health
Department of
Environmental Sciences and Engineering

The University of North Carolina at Chapel Hill
Rosenau Hall 201 H
Chapel Hill, N.C. 27514

MEMORANDUM

Would you like to know the views, practices and policies of U.S.A. *Regulatory* Agencies concerning flexibility in setting wastewater effluent standards? If so, we can help!

We are conducting a survey of certain regulatory problems and practices in water pollution control and ask that you complete this questionaire to provide information about your operations and policies. In return, we will be glad to send you a summary of information supplied by all of the other agencies that respond to this request.

It is well-known that assimilative capacities of streams vary widely in response to environmental variables, especially flow and temperature. Some regulatory agencies, in the interest of economy, have devised policies and methods to allow variability in effluent quality, within limits imposed by need for adequate protection of streams. Other states, faced with different conditions, continue to use single-level effluent standards based on specific limiting conditions of flow, temperature and other variables. Those adopting flexible systems have used different methods for their implementation, ranging from relatively simple two-level standards for "summer" and "winter" seasons to more complex, even continuously-variable effluent limits.

We conducted a survey on seasonal standards in 1979 and obtained data that were well-received by agencies and viewed as helpful in assessing regulatory policies and trends in methods for setting effluent standards. This survey will update that one and compile additional information on current policies, practices, rationale and methods employed in implementing flexible standards throughout the U.S.A. We feel that exchange of this information among the regulatory agencies should be helpful to them in many ways.

We have tried hard to make the questions as clear as possible, as well as quick and easy to answer. In many instances, simple check marks will supply the desired information. In others, a few words or numbers might be necessary. We encourage you to enclose reports, regulations, etc., whenever they could supply the desired information with less effort or better clarity. If some questions cannot be answered adequately, please complete the others anyway!

If you are not the proper person to respond to this questinaire, please pass it along to that individual, or let us know how we can contact him or her.

We appreciate your help and repeat that if you supply your name and address in the response we will be glad to send a summary of our findings to you. If you have any questions, please contact us by mail or phone.

Daniel Hull
Graduate Student

James C. Lamb III
Prof. of Sanitary Engineering
919 966 2488

1. DO YOU WISH TO RECEIVE A SUMMARY OF INFORMATION SUBMITTED BY ALL OF THE STATES RESPONDING TO THIS QUESTIONNAIRE?

YES___ Send to: _____

NO____ _____

_____

_____

2. HAS YOUR STATE BEEN DELEGATED RESPONSIBILITY FOR ISSUING NPDES PERMITS?

Yes____ No____

Please respond to the rest of this questionaire, whichever answer you give.

3. IDENTIFY THE TYPE(S) OF FLEXIBLE STANDARDS USED BY YOUR AGENCY:

___ Seasonal effluent standards

___ Monthly effluent standards

___ Hydrologic controlled releases of effluent

___ Continuously variable standards

___ We do not use flexible standards

___ Others (please explain):

4. HOW IMPORTANT, IN THE VIEW OF YOUR AGENCY, ARE THE FOLLOWING POTENTIAL BENEFITS OF FLEXIBLE STANDARDS?

Very Impt.	Less Impt.	Not Impt.	Potential Benefit
___	___	___	More rational -- easier to defend
___	___	___	Reductions in plant capital expenditures
___	___	___	Reduction in plant operating costs
___	___	___	Reduction in energy consumption
___	___	___	Reduction in No. of standards violations
___	___	___	Improved relations with dischargers
___	___	___	Others (please explain):

_____

_____

5. HOW IMPORTANT, IN THE VIEW OF YOUR AGENCY, ARE THE FOLLOWING POTENTIAL DISADVANTAGES OF FLEXIBLE STANDARDS?

Very Impt.	Less Impt.	Not Impt.	Potential Disadvantage
___	___	___	More paperwork may be required
___	___	___	More agency monitoring is needed
___	___	___	More discharger monitoring is needed
___	___	___	More agency personnel are needed
___	___	___	Setting standards is more complicated
___	___	___	More difficult to explain to dischargers.
___	___	___	Decrease in stream water quality at times.
___	___	___	Poorer relations with the public
___	___	___	Others (please explain)

_____

_____

6. IF YOUR AGENCY DOES NOT ISSUE FLEXIBLE STANDARDS, CHECK ALL ANSWERS THAT APPLY:

___ We have never used flexible standards.

___ We have not seriously considered adopting them.

___ We have considered the possibility for using them.

___ We are now considering their feasibility

___ We plan to use flexible standards in the future.

___ We do not plan to use them in the future.

___ We are uncertain about future use of flexible standards in our program.

___ We have used flexible standards in the past, but no longer do (Please explain reasons for the change).

_____

_____

_____

7. IF YOUR AGENCY DOES NOT USE FLEXIBLE STANDARDS, PLEASE CHECK REASONS THAT APPLY TO YOUR SITUATION:

___ Our climate does not favor use of flexible standards

___ There isn't enough demand on assimilative capacity of our streams to justify using flexible standards.

___ All of our dischargers can meet current standards without resorting to flexible ones.

___ We don't feel that there is enough benefit from flexible standards to warrant their use in this State.

___ We feel that our manpower and financial resources are inadequate for implementing them.

___ We do not feel that flexible standards are compatible with effective stream pollution control.

___ Other (please explain):

_____

_____

8. OF THE PERMITS NOW BEING ISSUED BY YOUR AGENCY, WHAT PERCENT INCLUDE FLEXIBLE EFFLUENT STANDARDS? (Check correct answer):

___ We always issue flexible standards (Virtually 100%)

___ We usually issue flexible standards (>70%).

___ We often issue flexible standards (30-70%).

___ We seldom issue flexible standards (<30%).

___ We never issue flexible standards (always require fixed, single level effluent standards).

9. FOR WHICH OF THE FOLLOWING WASTEWATER CHARACTERISTICS DOES YOUR AGENCY ISSUE FLEXIBLE STANDARDS?

___ BOD.

___ Suspended solids.

___ Color.

___ Ammonia Nitrogen. ___Nitrite/Nitrate nitrogen.

___ Fecal Coliforms. ___Total Coliforms.

___ Others (please identify):

10. YOUR AGENCY ISSUES FLEXIBLE STANDARDS TO PLANTS DISCHARGING INTO WHICH OF THE FOLLOWING TYPES OF WATERCOURSES?

___ All watercourses.

___ All rivers and Streams.

___ Only selected river basins.

___ Only designated segments of streams.

___ Lakes. ___ Wetlands. ___ Estuaries. ___ Ocean.

___ Others (olease identify):

11. WHEN YOU ISSUE FLEXIBLE STANDARDS, HOW ARE THE PERMISSIBLE CHANGES IN EFFLUENT QUALITY DEFINED?

___ The year is divided into two or more "seasons" that change on the same dates each year. Fixed standards then are issued for each season.

If so, do your "seasons" vary among different dischargers? YES_____ NO _____

What calendar periods are used in your state for defining those seasons? _____

_____

_____

___ Different standards are set for each of two or more "seasons", which change from year to year in resoonse to certain environmental variables (stream flow, temperature, etc,), without regard to calendar dates.

Which Variable(s) do you use?_____

_____

___ Discharge standards are allowed to vary more or less continuously in response to environmental variables (stream flow, temperature, etc), without regard to calendar dates.

Which Variable(s) do you use?_____

_____

IF THE ABOVE ALTERNATIVES DO NOT INCLUDE YOUR SYSTEM, PLEASE EXPLAIN IT OR INCLUDE REPORTS, ETC., THAT DO.

12. WHAT FACTORS USUALLY ARE CONSIDERED SPECIFICALLY BY YOUR AGENCY IN SETTING FLEXIBLE STANDARDS? (check all that apply -- if it would be more accurate and understandable to attach written procedures or reports as well, please do so).

___ Stream flows (estimates only).

___ Stream flows (statistical analyses of records).

___ Stream flow is specified in the standard.

How do you select the specific stream flows used in setting your standards (for example, $_7Q_{10}$ etc.)?

_____

_____

___ Estimated stream temperatures.

___ Recorded stream temperatures.

___ Stream temperature is specified in the standard.

How do you select the specific stream temperatures used in setting standards? _____

_____

_____

___ Recreational activities.

___ Commercial harvesting of aquatic life.

___ Others (please explain):

13. IN YOUR STATE, WHICH OF THE FOLLOWING TYPES OF DISCHARGERS ARE ELIGIBLE TO RECEIVE FLEXIBLE STANDARDS? (Check all that apply).

___ Municipal dischargers.

___ Non-Municipal dischargers:

(1) ____ Industrial dischargers

(2) ____ Other non-municipal dischargers

___ Only dischargers that request flexible standards.

___ Only dischargers that can demonstrate economic benefits

___ Others (olease explain):

14. PLEASE SUPPLY THE FOLLOWING INFORMATION ABOUT DISCHARGERS IN YOUR STATE:

How many dischargers are located in your state?

Municioal _____ Non- Municipal _____

(1) Industrial _____

(2) Other Non-Mun._____

How many dischargers currently have flexible effluent standards?

Municipal _____ Non-Municipal _____

(1) Industrial _____

(2) Other Non-Mun._____

15. IF POSSIBLE, PLEASE ESTIMATE THE 1982 SAVINGS, IF ANY, REALIZED IN YOUR STATE THROUGH USE OF FLEXIBLE STANDARDS.

Please check the basis for figures that you supply:

___ Estimated values

___ Based on studies (Include, if available)

	1982 Savings	Total $ Spent
Municipal Capital	$_____	$_____
Municipal Operating	$_____	$_____
Other Caoital (Identify)	$_____	$_____
Other Operating (Identify)	$_____	$_____

16. WHAT DO YOU EXPECT TO BE THE FUTURE (Say three years hence) POLICY OF YOUR AGENCY WITH RESPECT TO USE OF FLEXIBLE STANDARDS?

___ Much greater use of flexible standards

___ Somewhat greater use of flexible standards

___ Little or no change from our present practice

___ Somewhat less use of flexible standards

___ Much less use of flexible standards.

17. HAVE ANY INTEREST GROUPS IN YOUR STATE OBJECTED TO YOUR POLICIES CONCERNING FELXIBILITY IN STANDARDS (wishing either more or less flexibility)?

No _____ Yes_____ How Many Complaints? _____

Identify their major objections:_____

_____

_____

_____

Identify specific groups, or types of groups involved:

_____

_____

_____

Have those pressures affected structures of laws and regulations in your state? (Please explain).

_____

_____

_____

18. PLEASE OUTLINE ANY PROBLEMS THAT YOU HAVE ENCOUNTERED WITH FLEXIBLE STANDARDS WHICH SHOULD BE CONSIDERED CAREFULLY BY OTHERS USING OR PLANNING TO USE THEM.

19. PLEASE OUTLINE ANY OF YOUR EXPERIENCES OR METHODS THAT MIGHT BE HELPFUL TO OTHERS IN IMPLEMENTING OR SOLVING PROBLEMS IN USING FLEXIBLE STANDARDS.

20. WITH RESPECT TO YOUR MONITORING PROGRAM FOR INDUSTRIES AND MUNICIPALITIES, PLEASE CHECK ALL THAT APPLY:

___ Required effluent monitoring analyses and frequency are specified in all ___, or some ___, permits.

___ Required stream monitoring analyses and frequency are specified in all ___, or some ___, permits.

___ All monitoring is done by the dischargers.

___ Most of the monitoring is done by the dischargers.

___ Most of the monitoring is done by the Agency.

___ Agency monitoring is usually limited to occasional checks or special studies.

___ Flexible standards require more monitoring by the discharger (Slight Increase _____ Much more _____).

___ Flexible standards require more monitoring by the Agency (Slight Increase?_____ Much more?_____).

21. PLEASE IDENTIFY THE VIEW OF YOUR AGENCY WITH RESPECT TO THE FOLLOWING POTENTIAL PROBLEMS IN THE SELF- MONITORING PROGRAM CARRIED OUT BY YOUR DISCHARGERS (Identities of individual states will not be disclosed -- only for statistical use):

NO PROBLEM	OCCASIONAL PROBLEM	MAJOR PROBLEM	TYPE OF POTENTIAL PROBLEM
___	___	___	Poor or questionable sampling methods
___	___	___	Improper sample preservation and handling
___	___	___	Use of improper analytical methods
___	___	___	Inadequately-equipped laboratories
___	___	___	Improperly trained laboratory personnel
___	___	___	Unreliable (untrustworthy) personnel
___	___	___	Deliberate reporting of erroneous data
___	___	___	Accidental reporting of erroneous data

22. IF POSSIBLE, PLEASE ESTIMATE THE TOTAL ANNUAL COST (INCLUDING SALARIES, LABORATORY CHARGES, ETC.) OF EFFLUENT AND ASSOCIATED STREAM MONITORING IN YOUR STATE.

Please check the basis for figures that you supply:

___ Estimated values

___ Based on studies (include, if available).

Agency Monitoring $_____

Municipal Monitoring $_____

Non-Municipal Monitoring $_____

(1) Industrial Monitoring $_____

(2) Other Non-Municipal $_____

Other (Please explain):$_____

23. TO WHAT EXTENT DOES YOUR AGENCY CONDUCT SPECIAL FIELD STUDIES (STREAM SURVEYS, ETC.) AS PART OF THE PROCESS OF MAKING DECISIONS ABOUT ALLOWABLE PERMIT DISCHARGE CONDITIONS?

___ Virtually always (almost 100% of permits)

___ Usually (>70% of permits)

___ Often (30-70% of permits)

___ Seldom (<30%)

___ Never

When special studies are conducted, what proportions of them are carried out by the agency and dischargers, respectively?

Agency: _____% of field study effort

Dischargers: _____% of field study effort

When dischargers carry out special field studies as part of their efforts to insure reasonable permit conditions, how much weight does your agency give to those data?

___ None

___ It is of minor importance in the decision

___ It is of moderate importance in the decision

___ It is a very important factor in the decision.

___ We often base our decision on those data.

24. ESTABLISHING STANDARDS FOR DISCHARGE OF WASTES INTO INTERMITTENT STREAMS, INCLUDING NORMALLY DRY DITCHES, PRESENTS SPECIAL PROBLEMS TO THE REGULATORY AGENCY. PLEASE IDENTIFY YOUR POLICIES WITH RESPECT TO THESE DISCHARGERS:

___ Our standards for discharges into intermittent streams are set in the same way as for other types of streams.

___ Standards for these discharges differ from others in the following respects:

(1)_____

(2)_____

(3)_____

(4)_____

APPENDIX B

NOTE REQUESTING QUESTIONAIRE RESPONSE

Department of Environmental Sciences
and Engineering
UNC School of Public Health 201 H
Chapel Hill, N.C. 27514

From: James C. Lamb III

To: A few weeks ago we sent you a copy of this survey asking you to supply some information on your policies for setting standards. We have not yet received your completed survey. To receive meaningful results we need to hear from as many states as possible. This note is to remind you to complete the survey or forward it to the person responsible for these matters in your state. Upon completion of our study we will be happy to send you a condensation of the results from the responding states.

J. C. Lamb

APPENDIX C

ADDRESSES OF STATE WATER QUALITY MANAGEMENT AGENCIES

Alabama

James McIndoe
Water Division
AL Dept. of Env. Mgmt.
State Capitol
Montgomery, AL 36130

Arizona

Will Gilbert, P.E.
BWQC/ADHS
1740 W. Adams St.
Phoenix, AZ 85007

Arkansas

Niall O'Shaughnessy
8001 National Drive
Little Rock, AR 72209

California

Edward Anton
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

Colorado

Jeb Love
Permits and Enforcement
Water Quality Control Division
CDH 4210 East Avenue
Denver, CO 80220

Connecticut

Fred S. Banach
Water Compliance Unit
CT Dept. of Environmental Protection
122 Washington St.
Hartford, CT 06106

Delaware

Paul Jones
89 Kings Hwy.
Dover, DE 19903

Florida

G. Kobylinski or Bram Canter
Dept. of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301

Georgia

Jack Dozier, Section Chief
Water Quality Control Section
Georgia EPD
270 Washington St.
Atlanta, GA 30334

Hawaii

Environmental Permits Branch
645 Halekauwila St., 3rd Floor
Honolulu, HI 96813

Idaho

Water Quality Bureau
Division of Environment
Idaho Dept. of Health and Welfare
Statehouse
Boise, ID 83720

Illinois

Toby Frevert
Illinois EPA
2200 Churchill Rd.
Springfield, IL 62706

Indiana

L.J. Kane, Chief
Permits Section
Water Pollution Control Division
Indiana State Board of Health
1330 W. Michigan St.
Indianapolis, IN 46206

Iowa

Ralph Turkle
Iowa Dept. of Environmental Quality
900 E. Grand
Des Moines, IA 50319

Kansas

Karl W. Mueldener, P.E.
Water Pollution Control Section
Division of Environment
Bureau of Water Quality
Dept. of Health and Environment
Topeka, KS 66620

Kentucky

Robert W. Ware
Division of Water
18 Reilly Rd., Ft. Boone Plaza
Frankfort, KY 40601

Louisiana

Department of Natural Resources
Office of Environmental Affairs
Water Pollution Control Division
P.O. Box 44066
Baton Rouge, LA 70804

Maine

George W. Lord, Director
L & E, BWQC, DEP
State House Sta #17
Augusta, ME 04333

Maryland

Arcadio P. Sincero, P.E.
Chief, Permits Division
Office of Environmental Programs
Baltimore, MD 21201

Massachusetts

Paul M. Hogan
Division of Water Pollution Control
Lyman School
Westview Bldg., Rt. 9
Westborough, MA 01581

Michigan

Stephen G. Buda, P.E.
Surface Water Quality Division
Michigan Dept. of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Minnesota

Lanny Peissig
Minnesota Pollution Control Agency
1935 W. Country Rd. B-2
Roseville, MN 55113

Missouri

Robert H. Hentges
Missouri Dept. of Natural Resources
P.O. Box 1368
Jefferson City, MO 65102

Montana

Dept. of Health and Environmental Sciences
Water Quality Bureau
Capitol Station
Helena, MT 59620

Nebraska

State of Nebraska
Dept. of Environmental Control
Box 94877
Lincoln, NB 68509

Nevada

L.H. Dodgion
Nevada Div. of Environmental Protection
Carson City, NV 89710

New Hampshire

Stephen H. Roberts, P.E.
Director, P & S Division
NH Water Supply and Pollution Control Comm.
P.O. Box 95 - Hazen Drive
Concord, NH 03301

New Jersey

Shing-Fu Hsueh, P.E.
Bureau of Systems Analysis & Wasteload Allocation
P.O. Box CN-029
Trenton, NJ 08502

New Mexico

David F. Tague
Surveillance Section
Water Pollution Control Bureau
Environmental Improvement Division
Health and Environment Dept.
P.O. Box 968, Crown Bldg.
Santa Fe, NM 87503

New York

Albert W. Bromberg, P.E.
Chief, Water Quality Evaluation Section
NY Dept. of Environmental Conservation
50 Wolf Rd.
Albany, NY 12233

North Carolina

Forrest Westall, Head
Operations Branch, Water Quality
Division of Environmental Management
P.O. Box 27687
Raleigh, NC 27611

North Dakota

Francis Schwindt
ND State Health Dept.
1200 Missouri Ave.
Bismarck, ND 58501

Ohio

Richard Robertson, WQS
361 E. Broad St.
Columbus, OH 43216

Oklahoma

Nancy Cain
Oklahoma Water Resources Board
Box 53585
Oklahoma City, OK 73152

Oregon

Charles K. Ashbaker
Dept. of Environmental Quality
P.O. Box 1760
Portland, OR 97207

Pennsylvania

Theodore P. Clista
Division of Water Quality
PA DER - Fulton Bldg.
Harrisburg, PA 17120

Rhode Island

Division of Water Resources
Dept. of Environmental Management
Room 209 - 75 Davis St.
Providence, RI 02908

South Carolina

Larry E. McCullough
SCDHEC - Water Pollution Control
2600 Bull St.
Columbia, SC 29201

South Dakota

Dennis Rounds
Natural Resources Eng. III
Office of Water Quality, DWNR
Joe Foss Bldg.
Pierre, SD 57501

Tennessee

Paul E. Davis, Manager
Permit Section
Division of Water Management
150 Ninth Ave. N.
Nashville, TN 37203

Texas

Harry Pruett
Texas Dept. of Water Resources
P.O. Box 13087
Capitol Station
Austin, TX 78711

Utah

Jay Pitkin
Bureau of Water Pollution Control
P.O. Box 2500
Salt Lake City, UT 84110

Vermont

Gary Schultz
Chief, Permits and Compliance
Dept. Water Resources
State Office Bldg.
Montpelier, VT 05602

Virginia

Larry G. Lawson
P.O. Box 11143
VA. State Water Control Board
Richmond, VA 23235

Washington

Stan Springer
Dept. of Ecology
Mail Stop PV-11
Olympia, WA 98506

West Virginia

Pravin G. Sangani
Division of Water Resources
1201 Greenbrier St.
Charleston, WV 25305

Wisconsin

Jerome McKersie
Wisconsin Dept. of Natural Resources
Box 7921
Madison, WI 53707

Wyoming

John F. Wagner
Water Quality Division
1111 E. Lincolnway
Cheyenne, WY 82002

APPENDIX D - BIBLIOGRAPHY

1. Anon., Guide to Water Quality Standards of the United States, American Petroleum Institute, Washington, D.C., 1980.

2. Anon., "Water Pollution Control Agencies", Journal of the Water Pollution Control Federation, Vol. 54, No. 3, pp. 68-71, (1982).

3. Anon., "Changing the Clean Water Act: Reflections on the Long-Term", Journal of the Water Pollution Control Federation, Vol. 55, No. 2, pp. 123-129, (1983).

4. Anon., "New Approaches and New Concerns", Journal of the Water Pollution Control Federation, Vol. 54, No. 12, pp. 1531-1533, (1982).

5. Baxter, S.S., "Determination of Stream Use", Journal of the American Water Works Association, Vol. 56, pp. 1285-1289, (1964).

6. Boner, M.C., Furland, L.P., "Seasonal Treatment and Variable Effluent Quality Based on Assimilative Capacity", Journal of the Water Pollution Control Federation, Vol. 54, pp. 1408-1416, (1982).

7. Brown, H.B., "Back to Basics - A Viable Water Quality Management Alternative", abstract of paper given at the 53rd Annual Conference of the Water Pollution Control Federation, Sep. 28 - Oct. 3, 1980.

8. Busch, A.W., "Use and Abuse of Natural Water Systems", Journal of the Water Pollution Control Federation, Vol. 43, No. 7, pp. 1480-1483, (1971).

9. Campbell, I.C., "A Critique of Assimilative Capacity", Journal of the Water Pollution Control Federation, Vol. 53, No. 5, pp. 604-607, (1981).

10. Cleary, E.J., "Effluent Standards Strategy: Rejuvenation of an Old Game Plan", Journal of the Water Pollution Control Federation, Vol. 46, No. 1, pp. 9-17, (1974).

11. Comptroller General of the US, "Costly Wastewater Treatment Plants Fail to Perform As Expected", General Accounting Office, Washington, D.C., (1980).

12. Comptroller General of the US, "Savings Possible Through Use of Variable Effluent Limits For Advanced Waste Treatment Projects", General Accounting Office, Washington, D.C., (1982).

13. Dalpra, C., "Secondary Treatment Waivers Issued, Controversy Continues", Journal of the Water Pollution Control Federation, Vol. 53, No. 11, pp. 1554-1557, (1981).

14. Duletsky, S.A., "A Survey of the Use of Seasonal Effluent Standards by State Water Pollution Control Agencies", A thesis submitted in the Department of Environmental Sciences and Engineering, School of Public Health, The University of North Carolina at Chapel Hill, (1979).

15. Feliciano, D.V., "Water Quality Criteria and Standards Development: Trying to Make a Difficult Approach Manageable", Journal of the Water Pollution Control Federation, Vol. 52, No. 10, pp. 2418-2424, (1980).

16. Frye, R.S., "NPDES Rules For Industrial Dischargers: New Obligations, New Opportunities", Journal of the Water Pollution Control Federation, Vol. 54, No. 10, pp.1349-1354, (1982).

17. Hargett, D., Seagraves, J.C., "Benefits and Costs of Seasonal Effluent Permits in North Carolina", Report No. 135, North Carolina Water Research Institute, Raleigh, N.C., (1979).

18. King, S.D., "North Carolina Municipal Wastewater Treatment Plants: Impact of NPDES BOD_5 Permit Violations on Downstream Dissolved Oxygen", Report submitted in partial fulfillment of MSPH Degree, Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, (1982).

19. Kovalic, J.M., "Users Guide", The Clean Water Act with Amendments, Water Pollution Control Federation, Washington, D.C., (1982).

20. Lamb, J.C., III, "Conflict Between Energy Conservation and Water Pollution Control Standards", Journal of the Water Pollution Control Federation, Vol. 52, No. 4, pp. 656-660, (1980).

21. Lamb, J.C., III, "Improved Regulatory Control of Water Pollution Through Industrial Collaboration", Prepared for presentation at the 54th Annual Conference of the Water Pollution Control Federation, Oct. 4-9, 1981.

22. Lamb, J.C., III, "Feasibility of Increased Flexibility In Water Pollution Control Standards", Presented at the 1982 Meeting of the Virginia Water Pollution Control Association, Apr. 28, 1982.

23. Lamb, J.C., III, "Treatment Plant Failures: Facts, Fallacies, Solutions", Presented at the 14th Mid-Atlantic Industrial Waste Conference, June 1982.

24. Lamb, J.C., III, "Assessment of the Effectiveness of Seasonal Standards", Presented at a meeting of the North Carolina Water Pollution Control Association, Greensboro, N.C., Nov. 9, 1982.

25. Lee, G.F., Jones, R.A., Newbry, B.W., "Alternative Approach to Assessing Water Quality Impact of Wastewater Effluents", Journal of the Water Pollution Control Federation, Vol. 54, No. 2, pp. 165-174, (1982).

26. Lee, G.F., Jones, R.A., Newbry, B.W., "Water Quality Standards and Water Quality", Journal of the Water Pollution Control Federation, Vol. 54, No. 7, pp. 1131-1138, (1982).

27. Love, J., "Water Quality Based Effluent Limits in Domestic and Industrial Discharge Permits", Presented at a meeting of the Colorado Water Congress, Oct. 15, 1982.

28. Marshall, B.R., Lamb, J.C., III, "Evolving Water Quality Regulations", Presented at the ASCE Conference on "Water and Energy: Technical and Policy Issues", Pittsburg, PA, May, 1982.

29. McBride, G.B., "Nomographs For Rapid Solutions For The Streeter-Phelps Equations", Journal of the Water Pollution Control Federation, Vol. 54, No. 4, pp. 378-384, (1982).

30. Nemerow, N.L., Scientific Stream Pollution Analysis, McGraw-Hill, Washington, D.C., 1974.

31. Noss, R.R., Marks, D.H., "Improving the Development of Water Quality Standards", Journal of the Water Pollution Control Federation, Vol. 53, No. 4, pp. 426-429, (1981).

32. Patterson, J.W., Directory of Federal and State Water Pollution Standards, Illinois Institute for Environmental Quality, Document No. 77/06, 1976.

33. Rauch, R.J., "The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device", Harvard Journal on Legislation, Vol. 10, pp. 565-570, (1973).

34. Reheis, H.F., Dozier, J.C., Word, D.M., Holland, J.R., "Treatment Costs Savings Through Monthly Variable Effluent Limits", Journal of the Water Pollution Control Federation, Vol. 54, No. 8, pp. 1224-1230, (1982).

35. Schmidt, O.J., "Water Quality Standards Too Inflexible", Journal of the Water Pollution Control Federation, Vol. 53, No. 8, pg. 1271, (1981).

36. Tebbutt, T.H.Y., Principles of Water Quality Control, Pergamon Press, N.Y., 1977.

37. U.S. Congress, Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, October 18, 1972.

38. U.S. Environmental Protection Agency, "Questions and Answers On: Proposed Water Quality Standards Regulation", Washington, D.C., (1982).

39. Velz, C., Applied Stream Sanitation, John Wiley and Sons, New York, 1970.

40. Ward, R.C., Loftis, J.C., "Incorporating the Stochastic Nature of Water Quality Into Management", Journal of the Water Pollution Control Federation, Vol. 55, No. 4, pp. 408-414, (1983).

41. Witt, M.D., "Flexible Wasteload Allocations In Wisconsin", Water Resources Research Institute, (Oct. 1982).

42. Yake, W.E., James, R.K., "Setting Effluent Ammonia Limits To Meet In-Stream Toxicity Criteria", Journal of the Water Pollution Control Federation, Vol. 55, No. 3, pp. 303-309, (1983).


DATE
ILME